FLIGHT

and

AIRCRAFT ENGINEER

OFFICIAL ORGAN OF THE ROYAL AERO CLUB ONE SHILLING

SMITHSONIAN INSTITUTION
JUL 17 1946
LANGLEY AERON

The "Desford" Trainer A complete flying trainer embodying essentials to cover the whole of "ab initio" and "intermediate" stages of flying training

REID & SIGRIST

REID & SIGRIST LTD KIRBY MUXLOE LEICESTER

THE CENTURY OF EXPLORATION

The 15th Century pioneers sailed across the oceans discovering new lands. To-day, Williamson Photogrammetric air survey equipment obtains exact physical and geographical data in a moment of time.

The Williamson Manufacturing Co. Ltd

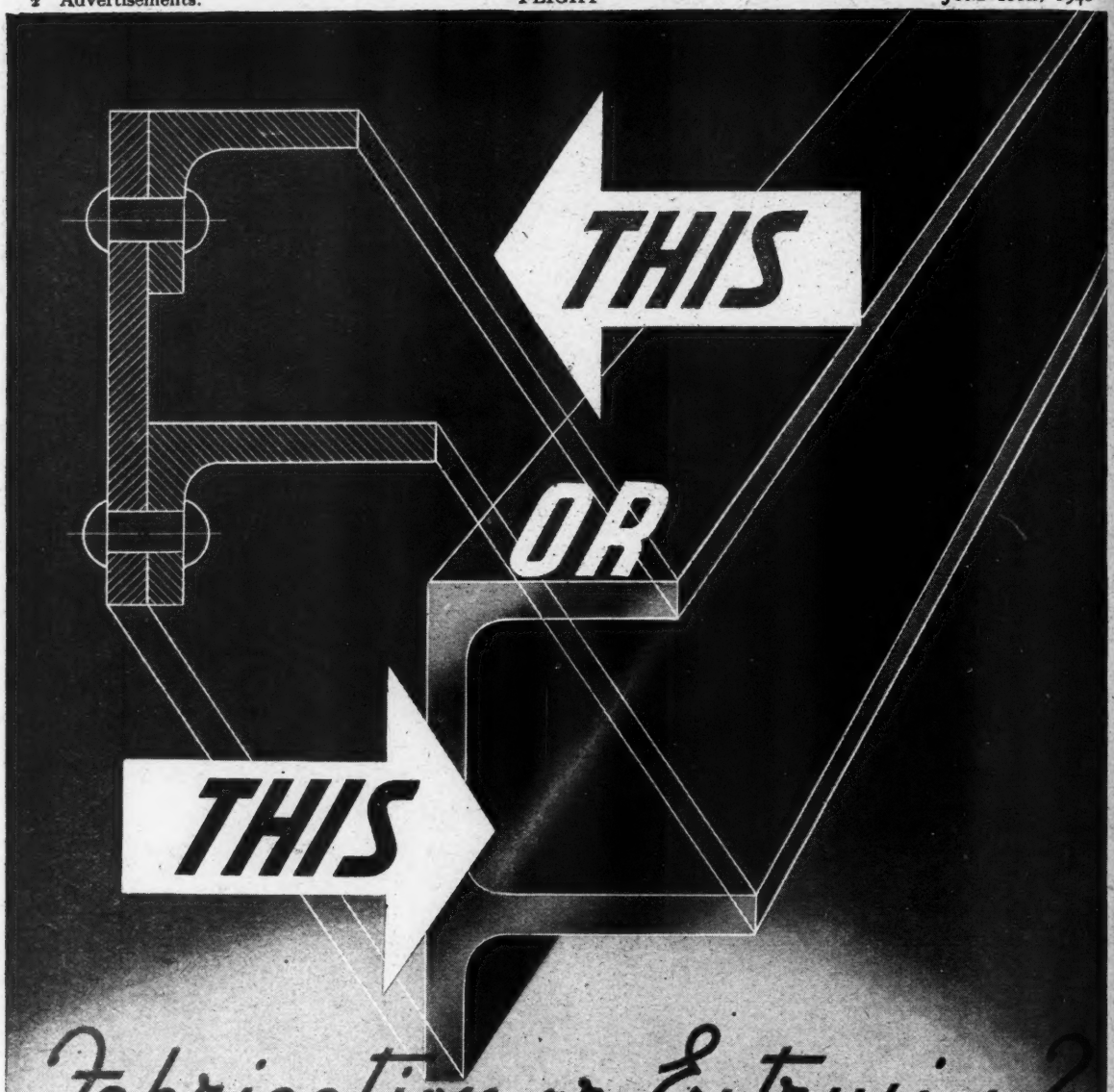
LONDON AND READING

LITCHFIELD GARDENS · WILLESDEN GREEN · LONDON · N.W.10

TELEPHONE : WILLESDEN 0073/5

TELEGRAMS : KINETOGRAM, WILL ROAD, LONDON. CABLES. KINETOGRAM, LONDON

The Blackburn
"FIREBRAND" IV
STRIKE AIRCRAFT OF THE ROYAL NAVY

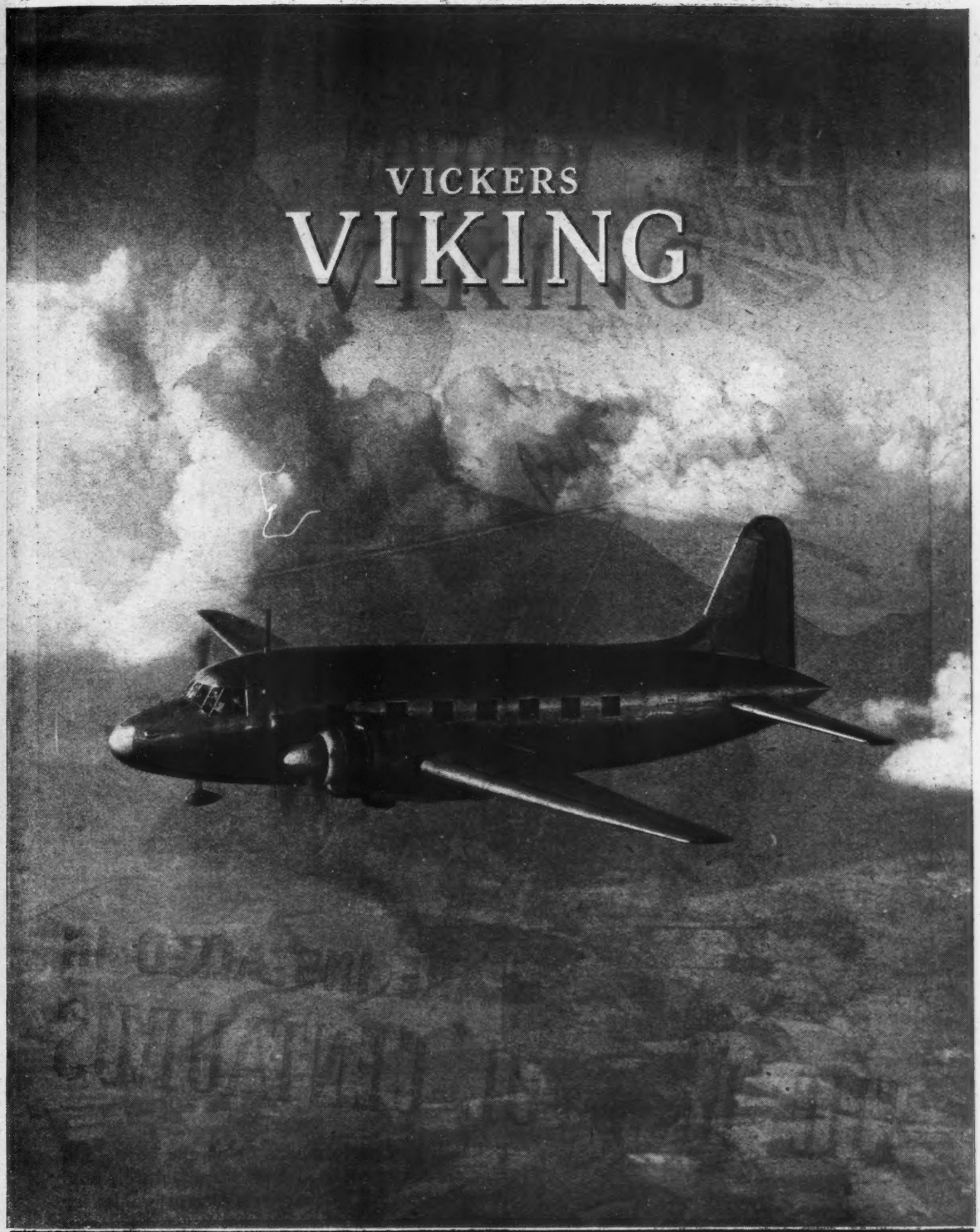


Fabrication or Extrusion?

Gone! Two unwanted flanges and two rows of expensive rivets. This is only one of a myriad examples showing the advantages gained by using extruded light alloys. The bulk of the metal is where it is wanted. The job is simpler, cleaner, stronger and lighter. Extrusion dies are relatively inexpensive. The possible savings by using extrusions are quite considerable. This is a matter worthy of your attention and a note to Birmetals will bring you all necessary particulars.

BIRMETALS LIMITED
QUINTON, BIRMINGHAM, 32

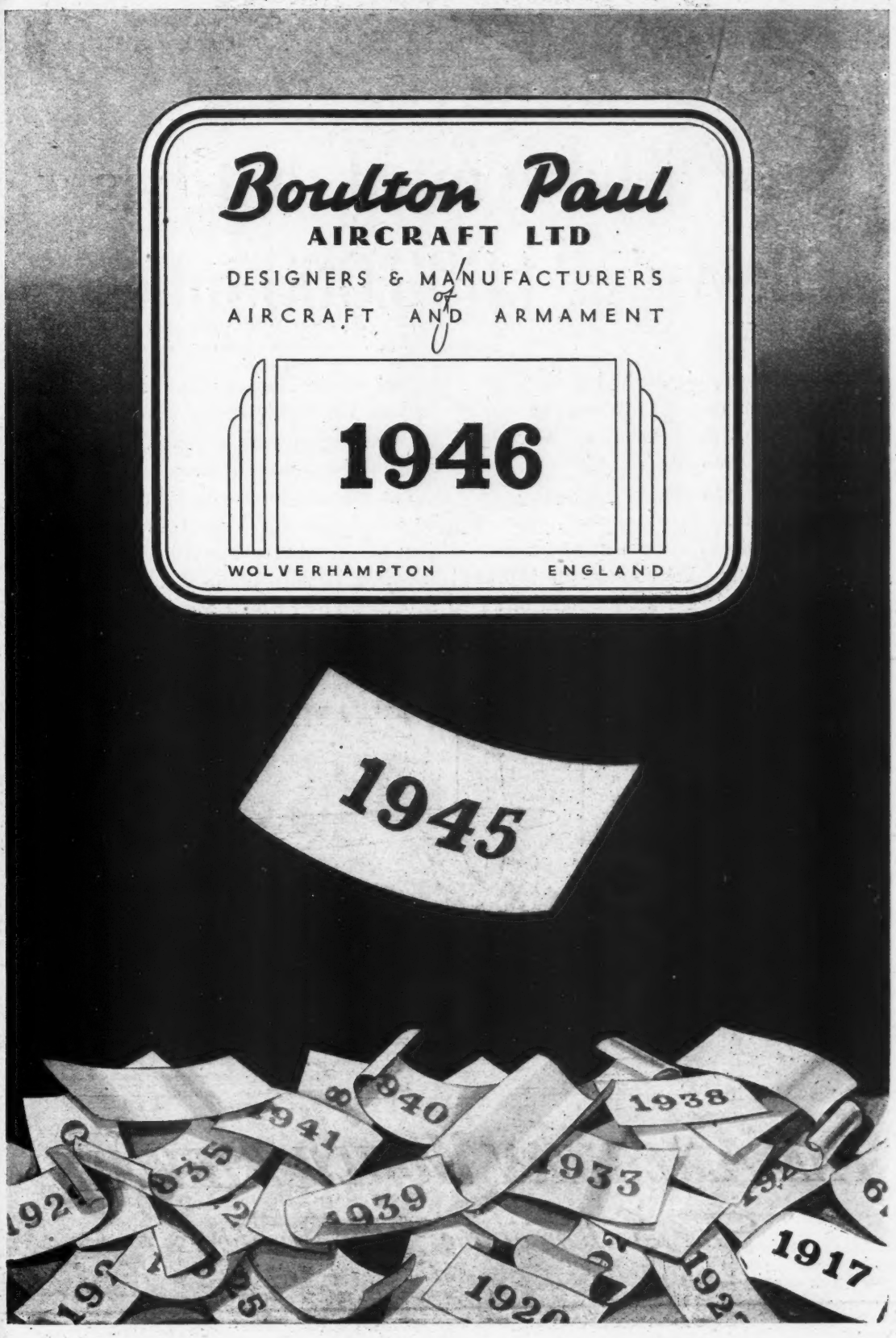
RP. 1047F



VICKERS-ARMSTRONGS
LIMITED
AIRCRAFT SECTION, WEYBRIDGE WORKS, WEYBRIDGE, ENGLAND

Reliability of performance being the keynote of aircraft components, aircraft manufacturers continue to install B.I.Callender's Aircraft Cables for low tension, high tension and radio frequency where their "built-in" dependability enjoys world-wide recognition by the Aircraft industry.

BRITISH INSULATED CALLENDER'S CABLES LIMITED
NORFOLK HOUSE, NORFOLK STREET, LONDON W.C.2


Boulton Paul
AIRCRAFT LTD
DESIGNERS & MANUFACTURERS
OF
AIRCRAFT AND ARMAMENT
1946
WOLVERHAMPTON ENGLAND
1945
1941
1940
1938
1933
1939
1917

PAA

The symbol that has flown 394,000,000 miles

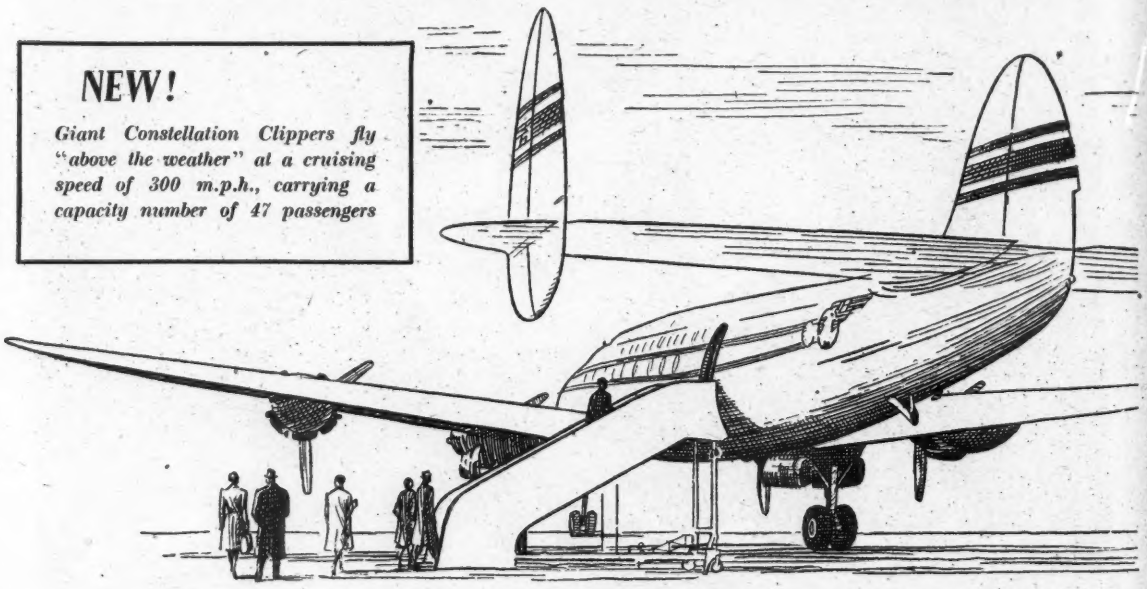
This symbol stands for flying efficiency gained by experience. In 18 years of over-ocean flying, Pan American Clippers have carried over four and a half million passengers to 68 different lands.

In the course of these years, during which the Clipper system has been constantly growing, Pan American World Airways have achieved a standard of air travel service that will be a revelation to you. You will want to fly to New York as soon as seats are available. Frequent schedules will make it easy.

For information, write or 'phone your Travel Agent—or United States Lines, General Agents for Pan American World Airways, 17 Pall Mall, S.W.1. WHItehall 4162. "Go by *Clipper* when you go."

NEW!

Giant Constellation Clippers fly "above the weather" at a cruising speed of 300 m.p.h., carrying a capacity number of 47 passengers



PAN AMERICAN WORLD AIRWAYS

The System of the Flying Clippers

Leytool

RATCHET SPANNERS

Prov. Patent No. 4746/44.

A.I.D. Approved 793672/38.

INDISPENSABLE FOR SERVICE TOOL KITS

ESSENTIAL FOR ASSEMBLY LINES . . .

The "Leytool" Ratchet Spanner is an essential aid to speed and ease in installation, assembly and servicing work. It saves time and money. It is four times faster than ordinary spanners, and gets into those awkward places where other spanners will not go. Made of carbon chrome steel, hardened all over, it is of great mechanical strength, and is the finest ratchet spanner made. Available in a number of stock sizes.

HEXAGON SIZES		
Standard Nut	Wrench Size	Width A/C Flats
0BA	1	.413"
1BA	1	.365"
2BA	1	.324"
3BA	1	.292"
4BA	1	.248"

3/16"	WHIT.	1 or 2	.448"
1/4"	,,	2	.525"
5/16"	,,	2 or 3	.600"
3/8"	,,	3	.710"
7/16"	,,	3	.820"
1/2"	,,	3	.920"
9/16"	,,	3 or 4	1.010"
5/8"	,,	4	1.100"
11/16"	,,	4	1.200"
3/4"	,,	4 or 5	1.300"
13/16"	,,	4 or 5	1.390"
7/8"	,,	5	1.480"
1"	,,	5	1.670"

Write for illustrated pamphlet showing the full range of standard sizes, and prices.

AS SUPPLIED TO ALL SERVICE GOVERNMENT DEPARTMENTS.

Distributors' enquiries invited for Home and Export trade.

SQUARE SIZES	
Wrench Size	Width A/C Flats
1	.250"
1	.313"
2	.375"
2	.438"
3	.500"
3	.625"
3	.750"
4	.875"
4	1.000"
4 or 5	1.125"
5	1.250"

1/4"	BSF	1 or 2	.448"
5/16"	,,	2	.525"
3/8"	,,	2 or 3	.600"
7/16"	,,	3	.710"
1/2"	,,	3	.820"
9/16"	,,	3	.920"
5/8"	,,	3 or 4	1.010"
11/16"	,,	4	1.100"
3/4"	,,	4	1.200"
7/8"	,,	4 or 5	1.300"
1"	,,	5	1.480"
1 1/8"	,,	5	1.670"

Leytool

PRECISION HAND DRILL

Prov. Patent No. 20987/44

This entirely new Hand Drill Brace is a noteworthy improvement in design on all previous hand drills. Well balanced, with a comfortable hand grip which fits snugly into the hand, it is compact in size, can be carried in the pocket, and is positively a pleasure to use. The standard of manufacture is equal to a high-grade precision tool for accuracy.

Solid one-piece die-cast body.

All gears accurately cut and totally enclosed, requiring absolute minimum of exertion. (Maximum power is obtained by rotating slowly.)

Accurate self-centring chuck.

Takes drills up to ¼-inch diameter.

Chuck spindle and jaws are hardened and tempered to resist wear.

Self-lubricating bearings, obviating necessity for oiling.

Ball thrust race takes the drilling pressure.

Write for fully descriptive leaflet.

Manufactured by

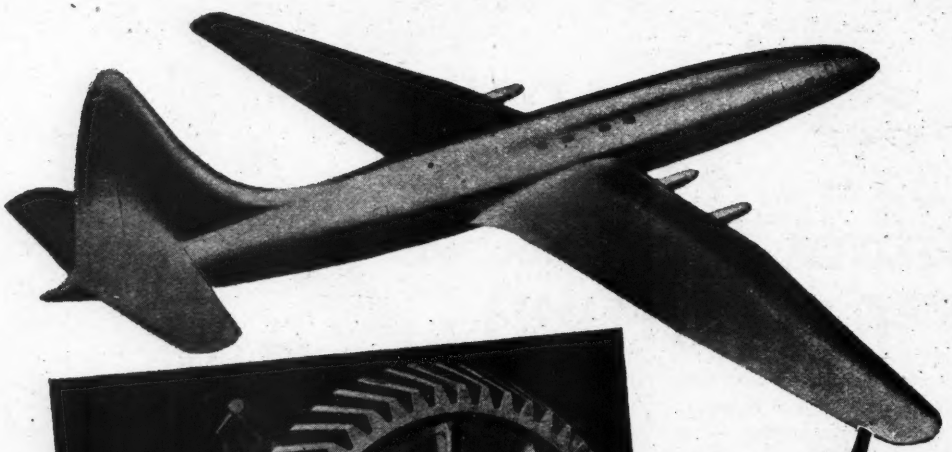
Leytonstone JIG & TOOL Co. Ltd.

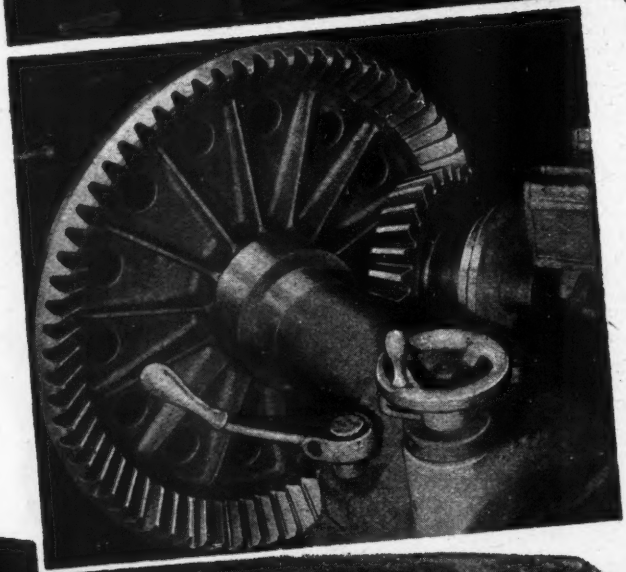
Phone: Leytonstone 5022-3.
Telegrams: "Leytool, Leystone."

606, HIGH ROAD, LEYTON, LONDON, E.10

Specialists in

JIGS & FIXTURES
PRESS TOOLS
AIRCRAFT ASSEMBLY JIGS & REFERENCE GAUGES
PLASTIC MOULDS
CAPSTAN LATHE WORK
DESIGNS & DRAWINGS
SMALL ASSEMBLY HAND TOOLS





In the making

The "Brabazon"—an unusual aircraft—requires gears of unusual type, manufactured with that exceptional precision and technique associated with the name "David Brown".

Identical facilities are at your service in the development of prototypes and in quantity production.

by DAVID BROWN & SONS (HUDDERSFIELD) LTD

While you wait...

The Airwork sales organisation has recently negotiated the purchase of three quarters of a million pounds worth of aircraft. Nevertheless orders should be placed NOW for aeroplanes, large or small, because a long waiting list exists. In the meantime, however, to meet urgent demands, a limited number of certain types are available. These, Airwork will be able to re-purchase on favourable terms, against orders for ultimate new aircraft.

The Airwork sales organisation does not deal exclusively with any one manufacturer's products and is therefore free to offer unbiased advice to its clients, whether regarding the largest air liner or the smallest personal plane.

THE SERVICES OF AIRWORK LTD

● Air Transport Contracting ● Operation and management of flying schools and clubs
● Sale and purchase of new and second-hand aircraft ● Fly-yourself and air-taxi hire

AIRWORK
LIMITED

AIRWORK LIMITED • WESTBROOK HOUSE • HOUNSLOW • MIDDLESEX
HOUNSLOW 5451

Another Outstanding Aircraft –

The MILES MARATHON

embodies Parts supplied by–

Brown Brothers (AIRCRAFT) Ltd.

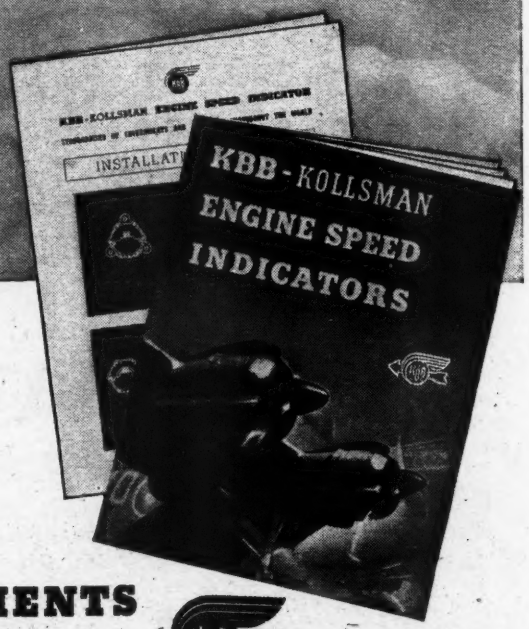
AIRCRAFT AND GENERAL ENGINEERS

HOUGHTON ROAD, NORTHAMPTON.

Have you had this series of–

AIRCRAFT INSTRUMENT FOLDERS?

In addition to our well known Maintenance Manuals we have published from time to time descriptive folders in colour containing useful filing material on Kelvin aircraft instruments and testing apparatus. Separate installation leaflets are also available.



Write for any of the following which interest you —

K.B.B.-KOLLSMAN SIMPLE ALTIMETERS, K.B.B.-KOLLSMAN SENSITIVE ALTIMETERS, K.B.B.-KOLLSMAN RATE OF CLIMB INDICATORS, K.B.B. AIRSPEED INDICATORS, K.B.B.-KOLLSMAN ENGINE SPEED INDICATORS, KELVIN SENSITIVE AIR PRESSURE GAUGE, KELVIN AIRCRAFT INSTRUMENT TESTING APPARATUS, K.B.B. VIBROGRAPH, KELVIN SENSITIVE AIRCRAFT BAROMETER.

KELVIN AIRCRAFT INSTRUMENTS

proven in reliability—ahead in design

KBB

KELVIN BOTTOMLEY AND BAIRD LIMITED • BASINGSTOKE

A NEW SERVICE

THAT MEETS THE NEEDS OF MODERN TRAVEL..

To-morrow many motorists will use the air as today they use the roads. Travel by plane will be as safe, practical and efficient as travel by car. It is to meet this new need that Automobile and Aircraft Services has been brought into being. This new organisation is the first to cover every post-war transport requirement for big industrial undertakings and private owners alike. It is a Sales and Service organisation for cars, commercial vehicles and planes—it is much more. It gives you on the one hand sound, practical and independent advice on the car, plane or commercial vehicles best suited to your purpose and your budget—on the other, service in the air and on the road specially designed to meet today's exceptional needs. Of these services, too comprehensive even to outline here, we will gladly give you fuller details.

- CAR, PLANE & TRUCK SALES AND SERVICE
- GOOD SECOND-HAND CARS AND TRUCKS BOUGHT AND SOLD
- AIR TAXI SERVICE
- HIRE PURCHASE ARRANGED ON ALL TYPES OF VEHICLE AND AIRCRAFT

● **Enquiries regarding Aircraft and Air Taxi Service, new or second-hand cars or trucks, should be addressed to A. and A. Services Ltd., 45 Dorset Street, London, W.1. Tel.: Welbeck 6461.**

AUTOMOBILE AND AIRCRAFT SERVICES LIMITED

URGENT CAR SERVICE

We can undertake urgent repairs or overhauls now. Write or telephone our West End Service Depot—17 Berkeley Mews, Upper Berkeley Street, W.1. Tel.: Welbeck 5058. Service Depot also at 59/65, Belsize Road, N.W.6.

In the great tradition

Eight out of every Nine operational aircraft of British manufacture delivered to the Royal Navy from all sources during the War were Fairey types.

Now, in the great tradition of earlier and famous Fairey aircraft, the Firefly Mark IV is coming into service in the Royal Navy.

FAIREY

THE FAIREY AVIATION COMPANY, LTD., HAYES, MIDDLESEX

FLIGHT and AIRCRAFT ENGINEER

Editorial Director G. GEOFFREY SMITH, M.B.E.
Editor C. M. POULSEN
Assistant Editor MAURICE A. SMITH, D.F.C. (WING CDR., R.A.F.V.R.)
Art Editor JOHN YOXALL

FIRST AERONAUTICAL WEEKLY IN THE WORLD : FOUNDED 1909

Editorial, Advertising and Publishing Offices: DORSET HOUSE, STAMFORD STREET, LONDON, S.E.1
Telegrams: Flightpres, Sedist, London. Telephone: Waterloo 3333 (50 lines.)

COVENTRY: 8-10, CORPORATION ST. Telegrams: Autocar, Coventry. Telephone: Coventry 5210.
BIRMINGHAM, 2: KING EDWARD HOUSE, NEW STREET. Telegrams: Autopress, Birmingham. Telephone: Midland 7191 (7 lines).
MANCHESTER, 3: 260, DEANSGATE. Telegrams: Iliffe, Manchester. Telephone: Blackfriars 4412.
GLASGOW, C.2: 26B, RENFIELD ST. Telegrams: Iliffe, Glasgow. Telephone: Central 4857.

SUBSCRIPTION RATES: Home and Abroad: Year, £3 1 0. 6 months, £1 10 6.

Registered at the G.P.O. as a Newspaper

No. 1956. Vol. XLIX. June 20th, 1946 Thursdays, One Shilling.

The Outlook

Short Shrift

THE official announcement that the Rochester works of Short Brothers are to be transferred to Belfast, while doubtless a sound step from a purely practical point of view, marks the severance of another link with the earliest days of flying. Brooklands has gone, so far as the public is concerned, and Hendon is an R.A.F. station. It was mainly at these two aerodromes that many of our early aviators took their first faltering steps, and similarly the Medway is closely associated with the birth and development of British seaplanes.

True, Shorts did not actually begin manufacture at Rochester; their earliest works were railway arches at Battersea, and later they moved to Eastchurch, Isle of Sheppey, but during the two wars, and the years between them, it was at Rochester that every new seaplane type was designed, built and tested, so that from the famous "two-two-five" floatplane of the first war to the Shetland flying boat of the second, the whole long line of Short types had their birth on the Medway.

British aviation has travelled a long way since Shorts first settled at Rochester, and the work done there can truly be said to have had a profound influence on the evolution of British marine aircraft. There is, of course, no reason to doubt that the good work will be continued at Belfast; the fact that the technical staff is being transferred is a guarantee of that, but it is a little sad to reflect that we shall not again see a Short flying boat piloted by Lankester Parker or by Geoffrey Tyson skim across Rochester Bridge and touch-down opposite the seaplane works.

Except for sentimental reasons, there is no doubt that Belfast is to be preferred to Rochester. The Short boats have been getting larger and larger, and it was becoming nothing less than an art to handle them on and above the narrow and winding Medway. The future of the really large class of aircraft may well lie with the flying boat, and at Belfast there is plenty of room, even if shipping may at times be something of a nuisance. From the point of view of manufacture there is, of course, no comparison. The Rochester works were built piecemeal, as and when expansion became necessary, and assembly of the Shetland wing to the hull had to be done in the open, as none of the shops was large enough.

While one must sympathize with the many workpeople who will have to change to occupations other than aircraft manufacture, the promise of the Parliamentary Secretary to the Ministry of Supply that some 200 or 300 will be given the opportunity to move to Belfast at the company's expense should ensure that the real craftsmen, many of whom have been with the firm for a very long period, will continue in the work they understand and, in many cases, with people they know.

Pointers to the Future?

AMONG the features of an aircraft suitable for the private owner demanded by the American designer Gwinn, in the paper which we published last week, were a horizontal fuselage attitude at landing and low landing speed. In an article in this week's issue Sqn. Ldr. Payn draws attention to the way in which the variable-incidence wing of the Supermarine 322 has overcome all the objections to the Handley Page full-lift slot. It would appear that the use of variable incidence, slotted and flapped wings and tricycle undercarriage might, in conjunction with a two-control system, provide a very useful combination.

The great drawback of the Handley Page fully slotted wing was that to reach maximum lift with a fixed-incidence wing, landing and slow flying had to be done in a very tail-down attitude, which greatly increased the drag and spoiled the pilot's view. The Supermarine 322 has shown that variable incidence overcomes these troubles, and also that very high lift can be generated by

the automatic leading-edge slot and the slotted trailing-edge flap (a maximum lift coefficient of 2.65 was recorded with engine off, and with engine on it reached the amazing figure of 3.9).

Mr. Gwinn suggested an automatic flap for keeping the fuselage substantially level. Such a device was tried by de Havillands twenty years ago, but the slotted and flapped wing with variable incidence gives very much greater lift, and thus a much smaller wing could be used for the same landing speed at a given wing loading.

Action

THINGS are beginning to move at long last in British civil aviation. The week-end brought news of the plans for internal air routes, of the record flight by B.O.A.C.'s Constellation from New York to London, and of other happenings connected with flying, such as the re-formation of the King's Flight.

"Planning" has become the blessed word of the Government, and it is comforting to find that in aviation some of the plans are now beginning to be translated into action.

The network of internal air routes forms a good beginning. That there may be changes and additions later is to be expected, as and when practical experience indicates such to be desirable. Most obviously useful are the cross-country services between our western and eastern coasts.

That His Majesty the King should have decided to modernize his fleet of aircraft must be a source of great satisfaction, showing as it does that the Royal Family intends to make extensive use of air travel in the future.

As for the record flight of the Constellation with a British crew, it would be well to bear in mind that such a time table will not always be maintained in actual service. That is no criticism of the aircraft, which is a very fine one, and even allowing for adverse winds on the regular westward run, and including scheduled stops, we may expect the new service to be a credit to all concerned.

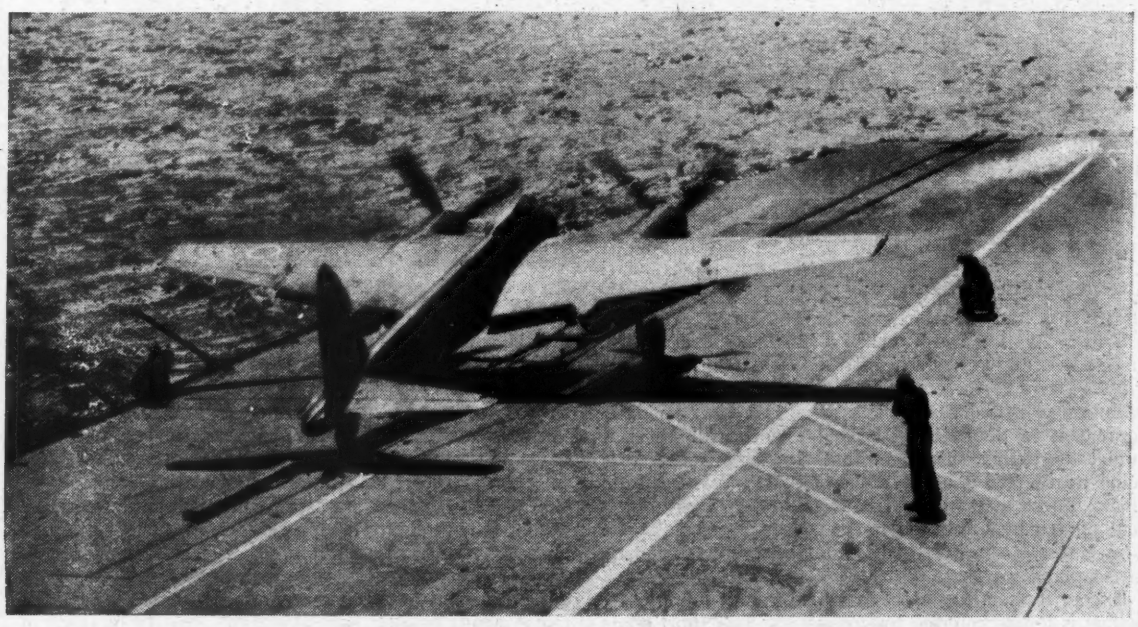
CONTENTS

The Outlook	611
P-51F Lightweight Mustang	613
Here and There	616
Birthday Honours	618
Netherlands Terminal	620
Brewers' Rook	622
American Newsletter	623
Britain's Test Pilots	a
Superlift	625
Civil Aviation	626
Fire Suppression	629
Sokol	632
Correspondence	633
Service Aviation	634
Operation Fly-past	635

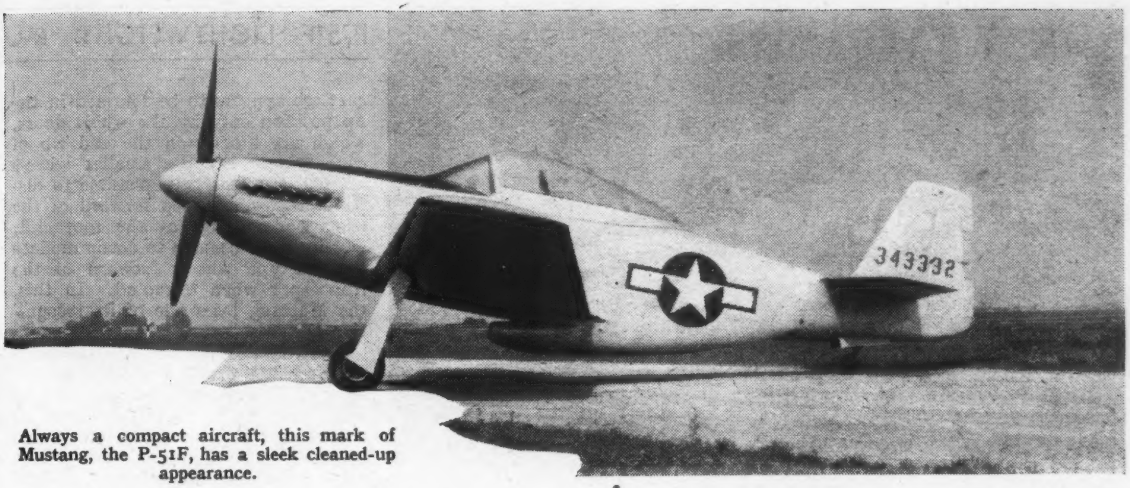
British Jets for U.S.A.

THERE was plenty of outspoken criticism when it was first announced that this country was to buy five Constellations for the Atlantic route. We took the view that provided deliveries were prompt, so that the delay in getting the service running was the shortest possible, no great harm was likely to be done.

The Government decided that we should swallow our pride and buy these American aircraft. It now looks as if the United States may be in a somewhat similar position in the matter of jet engines. The Rolls-Royce firm is in negotiation with American interests about the sale and subsequent manufacture in America of Rolls-Royce models, and although we are informed that, at the time of going to press, the negotiations are still proceeding, there appears to be every likelihood of agreement being reached.



FLIGHT-DECK URGE: A de Havilland Sea Hornet making its first accelerator take-off from the flight deck of H.M.S. *Triumph*. To get the aircraft exactly straight on the accelerator runway, it is wheeled down the diagonal white lines up to the baulks of timber bolted to the deck. When the front wheels touch the wooden blocks the tail is swung round until it is in position. The deck under the starboard wheel is soaped to facilitate turning.



Always a compact aircraft, this mark of Mustang, the P-51F, has a sleek cleaned-up appearance.

P-51F Lightweight Mustang

Ingenious Redesign Saves 1,500 lb Weight : New Undercarriage, Oil Cooler and Airscrew

By JOHN W. R. TAYLOR

THE advent of jet-propulsion, with its promise of super-sonic speeds and high power/weight ratio, has naturally had greater immediate effect on the design of fighter aircraft than any other types. In fact the day of the airscrew-driven warplane is now drawing rapidly to a close, although there are still several jobs that can be carried out very effectively by "attack" fighters such as the Fury or Hornet.

The man-in-the-street judges a fighter aircraft on two qualities—the number of guns that it carries and the speed at which it carries them. The designer, on the other hand, whilst striving for increased speed and armament, is invariably horrified by the consequent increase in weight. The little Sopwith Pup, weighing 1,225 lb fully loaded, carried one machine-gun, flew at 106 m.p.h. and has never been excelled for ease of control. By 1929 armament and speed had doubled, but the Furies and Bulldogs weighed nearly three times as much as the Pup. Ten years later the Hurricanes and Spitfires were carrying eight guns at speeds of between 300 and 400 m.p.h., but again the weight had risen, this time to around 6,000 lbs. Finally, the Americans announced with questionable pride that the P.47N Thunderbolt could carry eight guns, ten rockets and two 500 lb. bombs, all at the same time, adding that it weighed *around ten tons.*

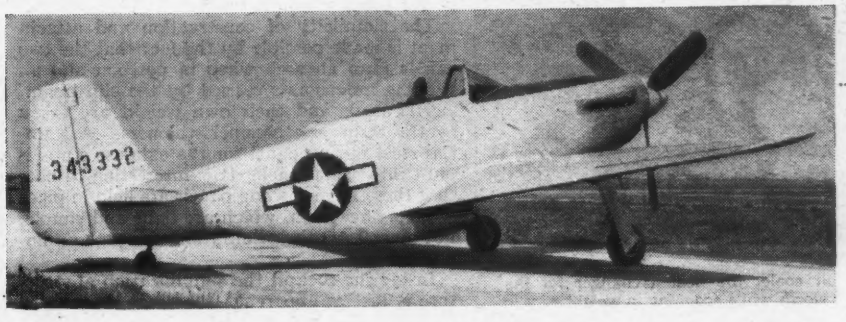
Jet-propulsion has done much to solve the problem. For instance, the Rolls-Royce Nene turbine-jet gives the equivalent of some 12,000 h.p. for a weight of only 1,550 lb. But even before jet-fighters became a practical proposition, many designers were trying hard to devise ways of reducing the size of their aircraft without impairing their efficiency. The P-51F Lightweight Mustang, details of which may now be given, is proof of the great strides made by at least one company in this direction.

Most of the recognition features of the earlier versions of the Mustang are still there and the P-51F has the same Packard-built Rolls-Royce Merlin engine that made the P-51D the finest escort fighter of its day. It is not until the machine is inspected closely that the amazing ingenuity of its design becomes apparent, ingenuity that has reduced its loaded weight by some 1,500 lb., with little reduction in operational equipment.

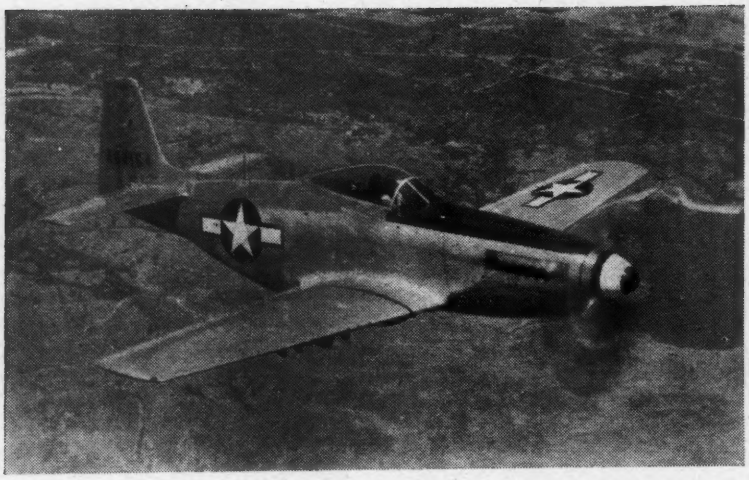
On first impression the P-51F may appear to be a cockpit hood with an aircraft attached, but aerodynamically and structurally there are a lot of useful lessons to be learned from it. The whole aircraft has been extensively re-designed, the weight saving being effected chiefly in three ways: (1) Simplification of structure. (2) Deletion of certain equipment. (3) Use of new materials.

Simplification of Structure

By far the most ingenious ideas are found in this category. Anybody can reduce the weight of a fighter aircraft by removing guns or operational equipment, but it takes a good man to devise ways and means of lightening a fighter like the Mustang,



Recognition features apparent in this photograph of the P-51F. are the slim tail portion of fuselage, elongated appearance of cockpit bubble and radiator duct, and the treatment of exhaust stubs and cowling.



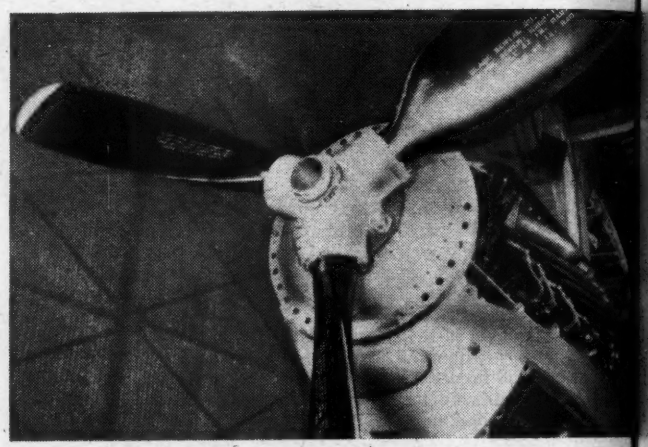
Developed from the P-51F, the North American P-51H showed a good weight reduction over earlier Mustangs. Small wheels enable the sweep-forward of the wing root leading-edge to be dispensed with. The engine is a Packard Merlin V-1650-7.

which has always been outstanding for its neat, compact and clean design. And yet North American have discovered ways of reducing the weight of almost every major unit.

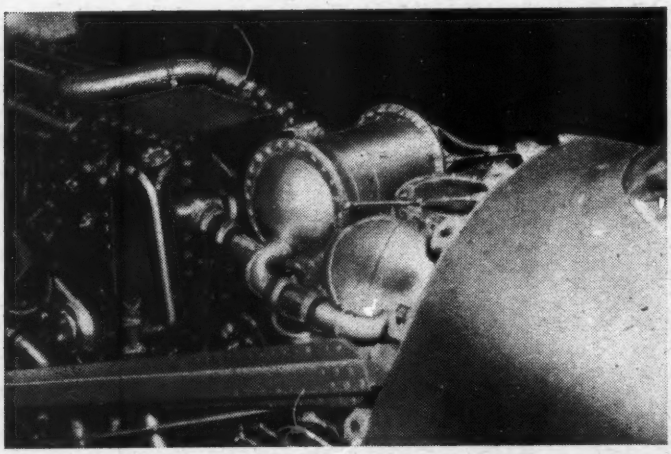
To take the undercarriage as an example; it was decided first of all that much smaller wheels and tyres could be fitted. The undercarriage is always the aircraft designer's bugbear, for, although only in use for a few seconds on take-off and landing, it can account for as much as 7 per cent of the aircraft's loaded weight. Obviously, therefore, the smaller it can be made, within certain safety limits, the better. The Lightweight Mustang has very small wheels, mounted on sideways-retracting legs of extremely simple design, and the Goodyear hydraulic brakes are also small and simple. Each brake consists basically of two drum-like chambers connected by an oil entry chamber. The "drums" contain piston assemblies faced with friction material, the pistons being forced by hydraulic pressure against thick steel brake shoes.

The side-stay mechanism of each undercarriage leg is a tiny, double-jointed structure which must reduce manufacturing time as much as it reduces weight, especially as it also acts as the undercarriage "down" lock; and the narrow-chord leg fairings are little more than plain metal sheets bolted to the legs. When retracted, the undercarriage appears to be retained in the up position only by the wheel doors, which are hinged on the end rib of each wing. Because smaller wheels are fitted, it has been possible to dispense with the sweep forward of the wing leading edge at the root end, which was necessary to accommodate the old-type wheels forward of the front spar when retracted. In this, the Mustang loses one of its recognition features.

The engine mounting has also been redesigned. Early versions had a structure consisting basically of two side beams built up of two channel-shaped extrusions with plate webs. On the P-51F, the outer plate web of each engine mounting beam actually forms the outside skin of the aircraft in that locality and so does a double job very effectively. The other engine



Known as the Unamatic, the hydraulic constant-speed airscrew on the P-51F has hollow blades and provision for a gun to fire through the hollow shaft

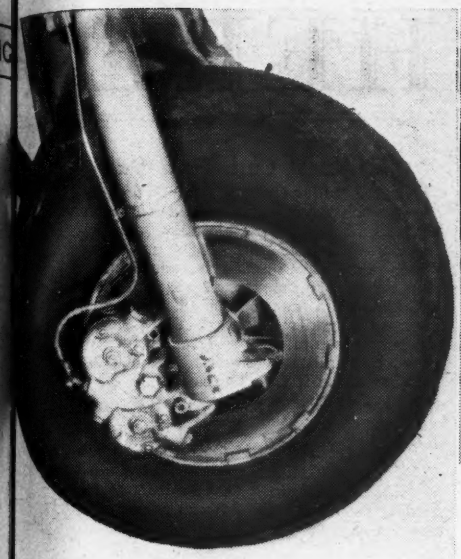


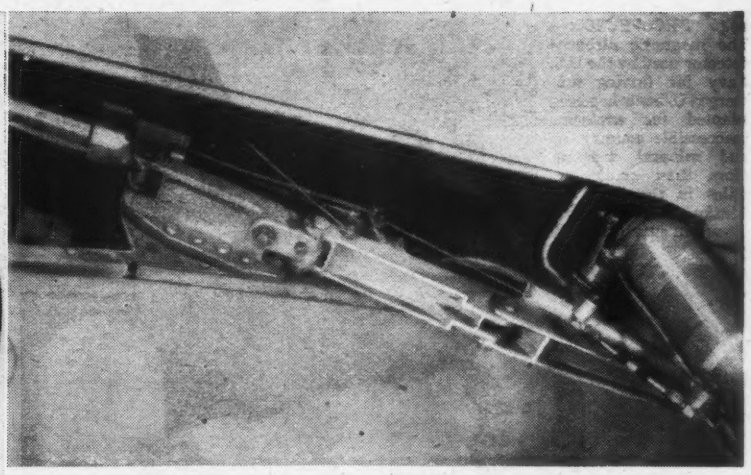
By comparison with the normal oil cooler the heat exchanger for the Packard-built Merlin gives a worth-while economy in weight.

cowling simply butts against its top and bottom edges. The two main engine cowling panels are also noteworthy as, although more than seven feet long and made of 20 s.w.g. light-alloy spot-welded to stiffeners, they are supported only at their front and rear edges. They cover the whole top portion of the engine above the engine mounting beams with the result that their removal makes maintenance work on the power plant a simple matter.

The simplicity of construction and attachment is made possible by the fact that the two panels form an arch when in position and all bending movements caused by the slipstream, inertia loads and their own weight are taken by the transverse channel stiffeners. A stainless steel fairing panel for the exhaust stubs is built into each panel. It is interesting to note that these large cowling panels are held in place by Dzus fasteners, which are light and simple, but must have their limitations for such an important job.

Inside the cockpit the simplification of structure is just as apparent. The seat is mounted





Small wheels and a very neat design for legs and retraction mechanism are features of the Lightweight Mustang.

on a single strut and is raised and lowered hydraulically. This mounting shows a considerable saving in weight over the old cast-frame structure, which was itself an example of clever design for saving production time and combining strength with simplicity. The seat is also unusual as it consists of a slab of pleasantly thick armour plate, with a metal bucket for the pilots' seat parachute strutted to it. It is made quite comfortable by fastening a rubber backrest to the armour. The engine control box is now little more than a thin gated plate box for holding the levers.

Two innovations of particular interest to the technical man will be the Harrison-built oil heat-exchanger and the Aeroproducts (General Motors) Unamatic Airscrew. Oil heat exchangers have been tried before and result in considerable saving in weight over a normal oil radiator with a comparable rate of heat dissipation. That on the P-51F certainly seems to work well. It is mounted above the engine, just forward of the oil tank on the engine firewall, with the result that the usual extensive "plumbing" from the engine and oil tank to an oil cooler are dispensed with. Similarly there is no need for cooler fairings with their controllable shutters in the airflow, or a viscosity valve, and there is no danger of the oil freezing.

This particular type of heat exchanger uses intercooler fluid to cool the oil, and is controlled by a thermostatic valve mounted just forward of it. Oil begins to flow through the exchanger at a temperature of 54 deg. and all the oil is taken through it at a temperature of 71 deg. C or above. The hot oil from the engine passes through copper tubes inside the exchanger, back to the oil tank, while the ethylene glycol water mixture from the intercooler system flows continuously round the tubes.

Several interesting features characterize the three-bladed, hydraulic Unamatic, constant-speed airscrew. The most important is that the wide paddle blades are made of hollow steel stiffened by an internal longitudinal rib. The whole airscrew is made as one unit with an integral governor; and there is a hole through the centre of the hub to accommodate a cannon.

Deletion of Equipment

Under this heading, the chief modifications are immediately obvious, but, in this case, even more care had to be exercised, for as soon as one starts removing operational equipment or fuel from a fighter, efficiency begins to slump very rapidly. In designing the P-51F, the North American Company wanted to retain as much as possible of the Mustang's operational efficiency and yet, obviously, some of the armament and equipment had to go. First of all two of the 0.5 inch wing guns were removed. This no doubt was a blow to those who believe that the best fighter is the one with most guns.

The P-51F has only one fuel tank in each wing, but they are of quite large capacity and can be supplemented by a 75-gal. drop tank under each wing when bombs or rockets are not fitted. The comparatively small fuel capacity is partially offset by the light weight of the aircraft, which has the same mark of Packard-built Rolls-Royce Merlin as that of the P-51D.

New Materials

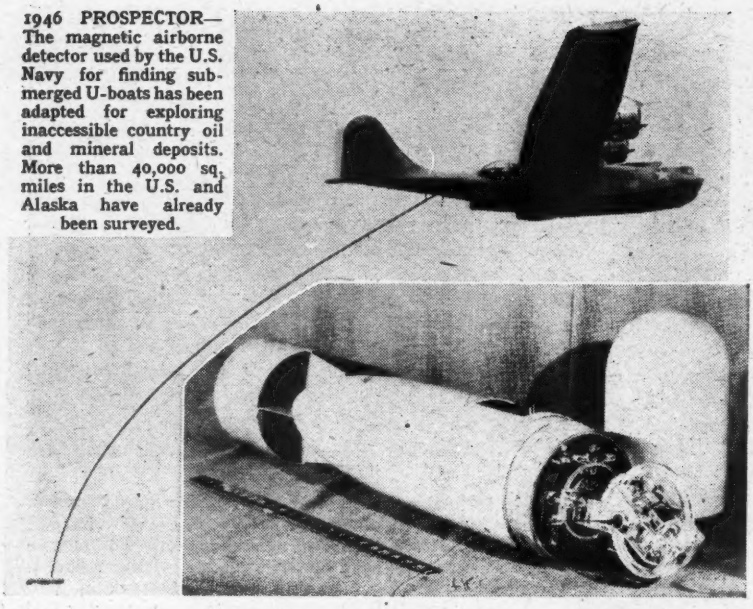
Much less apparent than the simplification of structure and deletion of equipment; a considerable saving in weight has, nevertheless, been effected by the use of plastics. For instance, the large access doors for the radio and for the tail wheel, just forward of the tailplane, are made of resin-bonded fabric, which does the job very well when structural strength is not required.

Earlier fuel tanks were made of collapsible non-metallic fibrous material and these are not changed on the P-51F. This fact is worthy of note as these tanks are less weighty and easier to handle than normal metallic tanks.

It is difficult to sum up the advantages and disadvantages of the P-51F as it was not used operationally, but it seems a worthy successor. It lacks some of their range and punch, and would, consequently, have had a more limited tactical applicability, but it should have made up for that in performance and ease of control. It proved popular with British and American test-pilots, the only immediately obvious criticism being that the very large cockpit hood seems to give far more distortion in a rearward view than that of British fighters such as the Tempest.

From the maintenance point of view it has some drawbacks, but a number of advantages. For instance, servicing is greatly facilitated by the provision of numbers of convenient access doors, while the fact that the aircraft is very low to the ground, reduces the need for ladders and scaffolding. The gun access doors are particularly neat and would gladden the heart of any armourer. Against these assets must be weighed the fact that to take out a fuel tank necessitates the removal of the flap and part of the rear spar web, and the bolt arrangement on the centre-line of the aircraft must make wing interchangeability difficult compared with the more orthodox wing-to-fuselage pin joint fixings.

On the whole, however, the P-51F shows what can be done when designers are given every encouragement to develop their own ideas on what a fighter should be like. It did not go into production, but it taught many valuable lessons that were later incorporated on the P-51H, which served with distinction in the closing months of the war.



1946 PROSPECTOR—The magnetic airborne detector used by the U.S. Navy for finding submerged U-boats has been adapted for exploring inaccessible country oil and mineral deposits. More than 40,000 sq. miles in the U.S. and Alaska have already been surveyed.

HERE &

Southampton Static Exhibition

ON Saturday, June 15th, Air Marshal Sir Philip Joubert opened the Aircraft Static Exhibition associated with the Victory Air Pageant organized by the Southampton branch of the Air League of the British Empire and scheduled for Saturday, June 22nd at Southampton Airport (Eastleigh).

Some forty aircraft firms are represented and many of the leading manufacturers are exhibiting models of aircraft, components or complete power units. *Flight* is represented at the Static Exhibition held in the St. Mary's Hall.

Bristol Projects

FIRST public mention of the Bristol Proteus gas turbine engine fitted with contra-rotating airscrews was made by Sir William G. Verdon Smith, chairman of the Bristol Aeroplane Co., Ltd., in his address to the firm's recent annual meeting. Sir William's report was read by Mr. W. R. Verdon Smith.

Referring to civil types of aircraft under construction by the company, he mentioned that, although the prototype Bristol 167 (Brabazon I) would be fitted with Centaurus piston engines, "subsequent aircraft are being designed to take Bristol Proteus gas turbines driving contra-rotating propellers."

Sir William also said that the company's endowment of a Chair of Aeronautical Engineering at Bristol University (announced in *Flight* some time ago) would cost about £60,000 spread over a number of years. It is known as the Sir George White Chair in commemoration of the founder and first chairman of the Company. Dr. A. R. Coller, lately of the R.A.E., is first White Professor of Aeronautical Engineering.

Captain E. I. Short

IN our issue of June 6th we recorded the retirement from business, due to ill-health, of Captain E. I. Short. His friends will learn with regret that he died last week in Ashford County Hospital.

N.H. Model Club Gala Day

THERE will be seven model contests on the programme for the Northern Heights Flying Club Gala Day planned for Sunday, June 30th. The meeting, which takes place on Langley aerodrome, near Slough, commences at 10.30.a.m.

Competition for the *Flight* Cup for the best open glider duration flight commences at 2 p.m. following a flying display by full-size aircraft from the Hawker Aircraft Co. Prizes will be presented after the meeting, at 7 p.m.

Jet-engined Speedboat

SIR MALCOLM CAMPBELL announced last week that he intends to attack his own World's Water Speed Record next autumn with a jet-propelled boat.

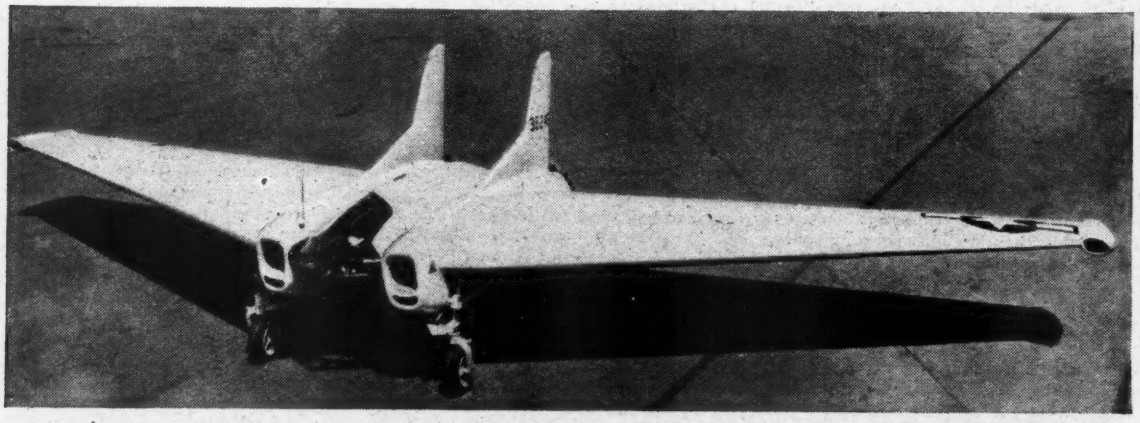
His present record, set up on Coniston Water in August, 1939, in *Blue Bird II*, stands at 141 m.p.h..

Tank and wind-tunnel tests are being carried out, he told Press representatives, and he intends to use the same hull as before. *Blue Bird II* was powered by two 1,800 h.p. Rolls-Royce piston engines, but what type of jet engine will replace them is not yet stated.

Air Council Reception

THE Air Council gave a reception on Thursday, June 6th, in honour of the high Allied and Commonwealth Officers who attended the Victory Celebrations as guests of the British Government. It was mainly a Service occasion designed to afford the visitors an opportunity of meeting members of the Air Council (including some past members) and the Royal Air Force Commanders taking part in the Victory Parade. The Air Attaché's of Allied countries were among the guests.

The reception was held in the Air Council Chamber at the Air Ministry, Whitehall, and Lord Stansgate, the Secretary of State for Air, and Lady



FLAT OUT: The pilot lies prone in the new Northrop XP-79 twin-jet fighter shown above at Wright Field. The Westinghouse turbine jet units give a combined thrust of only 2,800 lb but this low output is partially offset by comparatively small dimensions—span 38 ft, length 14 ft. The duct at the wing tips may be drag rudders or they may be associated with boundary layer control. Other points to note are the square jet intakes and the "bedstead" undercarriage.

& THERE

Stansgate received the guests in company with Mr. Geoffrey de Freitas, M.P., Parliamentary Under-Secretary of State, and Marshal of the Royal Air Force Lord Tedder.

Fierce Competition

HARDLY had we sorted out the claims and counter-claims of Mrs. Morrow-Tait and Mrs. Taylor-Young and their respective flying schools as to who was the first (a) woman, and (b) mother to solo since the war (see "Rival Flying Mothers" in "Here and There," June 6th issue) than we received a letter from Wolverhampton Flying School informing us that they successfully soloed Miss Joyce Tildesley, of Wolverhampton Aero Club, on May 16th after 5 hr 5 min dual instruction in an Auster.

The Wiltshire Club's claim for Mrs. Taylor-Young did not give her actual date of soloing during the merry month of May, so we cannot say at the moment if she has now been beaten for second place in class (a) by her Wolverhampton rival, but feminine competition is certainly getting fierce.

We await further developments with our fingers crossed!

R.-R. Appointment

FOLLOWING upon the appointment of Mr. E. W. Hives as managing director of Rolls-Royce, a reorganization of executives has taken place, and Mr. T. S. Haldenby has been made general manager.

Mr. T. S. Haldenby

One of the oldest associates of the late Sir Henry Royce, to whom he was apprenticed, Mr. Haldenby drove the first Royce car out of the old works at Manchester; for the past ten years he has been the company's deputy general works manager.

Mr. Haldenby was responsible for the planning, building and equipping of the Rolls-Royce factories at Crewe and Glasgow, and also for the conversion and improvisation of the numerous Rolls-Royce dispersal premises which supplemented engine production during the war.

NICE WORK! Fireflies of No. 816 Squadron which took part in the Victory Day fly-past over London formate with truly Naval precision. They have the glossy camouflage finish now used by the Naval Air Arm.

News in Brief

JET-PROPELLED aircraft will be classed separately from piston-engined types in the U.S. National air races. This was indicated when preliminary plans were made known for the post-war resumption of the annual three-day event starting on Aug. 20th.

* * *

The development of air training and traffic in Canada during the war is reflected in a Dominion Bureau of Statistics report outlining Canadian consumption of "gasoline and fuel oils" from 1940 to 1945. Aviation petrol consumption [illegible]om 12,660 barrels in the first [illegible] 1940 to a peak of 472,014 [illegible]ptember, 1945; then it declined to 33,561 barrels in December, 1945.

* * *

Sqn. Ldr. J. L. N. Bennett-Baggs, a director of Blackburn Aircraft, Ltd., is now recovered from his recent illness and is to take charge of sales and matters dealing with flying operations. He will be at the firm's London office at 11, Upper Grosvenor Street, W.1.

* * *

Mr. S. A. Powell-Jones is relinquishing his post as editor of technical publications for the Rolls-Royce aircraft division in order to return to his home in South Africa this month, after 16 years in the aircraft industry in this country.

* * *

The 17,000-ton aircraft carrier *Theseus* makes use of an ordinary traffic light to signal permission to take-off to pilots under training. Having been slightly damaged during celebrations after an international football match in Glasgow, the traffic light was destined for the corporation scrap-heap but, to quote a senior officer of the *Theseus*, "We acquired it by private enterprise."

* * *

Speaking before a Senate sub-committee on U.S. aviation policy, General Spaatz, who has succeeded General Arnold as head of the U.S.A.A.F., said that they needed a permanent national aviation council to "co-ordinate, strengthen and preserve American national air power at a level second to none."

* * *

Formation of an R.A.F. cinema corporation to fill the gap caused by the closing of Ensa cinema division has been approved by the Air Council. It will be run on commercial lines by a civilian staff and will be self-supporting within the R.A.F. Representatives of the cinema industry have been consulted.

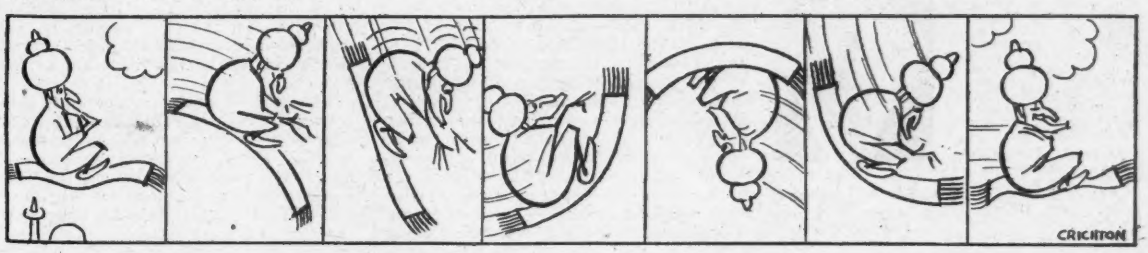
* * *

Mr. G. W. Derbyshire, until recently a test pilot with Auster Aircraft, Ltd., has set up in business by forming a company, Continental Deliveries, to ferry aircraft from the manufacturers to purchasers abroad. He has just made a delivery to a customer in Cairo.

* * *

American students undertaking post-graduate work at colleges in Latin America may again compete for "fellowships" covering the return fares by air between their homes and the selected college. These fellowships (we should call them scholarships) were introduced ten years ago by Pan American Airways but suspended during the war. South American students bound for U.S. colleges enjoy similar facilities.

AIRSTRIP . . . . No. 19



Birthday Honours

Industry Executives, Designers and Research Scientists Decorated on the Occasion of the King's Birthday : Many Service Awards

VISCOUNT

Marshal of the R.A.F. Sir Cyril L. N. Newall, O.M., Governor-General and Commander-in-Chief in New Zealand, 1941-1946.

KNIGHTS BACHELOR

H. W. L. Kearns, Director-General of Production Services, Ministry of Supply; R. C. Rootes, President of the Society of Motor Manufacturers and Traders.

Mr. R. C. Rootes, President S.M.M.T. —a knighthood.

ORDER OF THE BATH

ROYAL AIR FORCE

C.B. (Military Division)

Air Vice-Marshals G. Combe, W. J. B. Curtis, A. P. Davidson, C. E. N. Guest, A. E. Panter, D. F. Stevenson, S. E. Todmer. Air Commodores G. W. Birkinshaw, D. W. Clappen, T. Fawdry, R. G. Hart, W. Thorne, F. E. Vernon, C. McC. Vincent, G P. Chamberlain, Grp. Capt. H. E. Nowell.

C.B. (Civil Division).

J. G. Gibson, Prin. Asst. Sec., Air Ministry.

ORDER OF THE BRITISH EMPIRE

Civil Division

G.B.E.

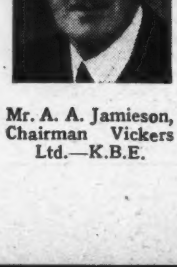
The Rt. Hon. Edward Mauger Iliffe, Baron, Chairman, The Duke of Gloucester's Red Cross and St. John Appeal Fund.

K.B.E.

Sir Maurice Edward Denny, Bt., lately President of the Air Registration Board; Archibald Auldjo Jamieson, Chairman, Vickers, Ltd.; Edwin Noel Plowden, Chief Executive, Ministry of Aircraft Production.

C.B.E.

T. G. S. Babb, Chief Mech. and Electrical Engr, Air Ministry; R. E. Bishop, Chief Designer, de Havilland Aircraft Co., Ltd.; Prof. P. I. Dee, F.R.S., lately Supt. Telecommunications Research Estab., Ministry of Aircraft Production; E. M. Fraser, lately Director-Gen. of Aircraft Production, Ministry of Aircraft Production; T. Fraser, Director, Metropolitan-Vickers Electrical Co., Ltd.; H. Grinsted, Director of Technical Research and Development, Ministry of Aircraft Production; J. Joseph, Managing Director, Aeronautical and General Instruments, Ltd., Croydon; Capt. A. G. Lamplugh, Underwriter and Principal Surveyor, British Aviation Insurance Co., Ltd.; W. B. Lewis, F.R.S., for services as Supt. Telecommunications Research Estab., Ministry of Aircraft Production; F. Montague, M.P., Parliamentary Secretary, Ministry of Transport, 1940-41, and Ministry of Aircraft Production, 1941-42, for political and public services; A. A. Rowse, Chairman, S. G. Brown, Ltd.; E. W. Taylor, Joint Managing Director, Cooke, Troughton and Simms, Ltd.; T. Walmsley, Chief Radio Engr., Air Ministry; A. H. Wilson, Principal Asst. Sec., Ministry of Civil Aviation.



Mr. A. A. Jamieson, Chairman Vickers Ltd.—K.B.E.

Military Division

ROYAL AIR FORCE.

K.B.E.

A.M. Andrew Grant; A.M. A. Durston A.V-M. John Josias Conybeare, R.A.F.V.R.

D.B.E.

Air Chief Cmdt. Lady Ruth Mary Eldridge Welsh, W.A.A.F.

C.B.E.

Air Comdres. L. K. Barnes; W. C. Cooper; A. P. Ledger; P. C. Livingston; W. G. W. Prall; F. A. Skoulding; The Rev. J. A. Jagoe; Air Cmdre. O. W. de Putron; Air Comdre. E. D. D. Dickson; Air Comdre. R. F. Osborne; Air Comdre. V. B. Ranford; Air Comdre. R. E. de T. Vintras; Group Capt. C. R. S. Bradley; H. W. Capener; A. W. Gray; W. H. Hutton; J. V. Mason; C. Rapley; G. N. J. Stanley-Turner; N. T. Goodwin, R.A.F.V.R.; J. H. Green; G. P. Marvin, R.A.F.O.; C. L. Stubbs, R.A.F.V.R.; H. J. Wilson. Wing Cdr. J. L. Barker, R.A.F.O.; Matron-in-Chief Gladys Taylor, Princess Mary's R.A.F. Nursing Service.

O.B.E.

Group Capts. N. C. Odbert; T. C. Shore, R.C.A.F.; R. A. R. Coote-Robinson; V. C. Darling; A. J. Dow, R.A.F.V.R.; P. H. Gibbings, R.A.F.O.; F. C. Gillman, R.A.F.V.R.; F. Gomersall; C. Hartley; N. M. Heath, R.A.A.F.; I. Hodgson; P. McDiarmid; P. B. L. Potter; C. G. Prior; E. L. J. Rowe, R.A.F.O.; G. H. White. Wing Cdrs. F. C. Clarke; R. M. Craig; M. D. Day; A. L. Derry; H. Hawkins; H. Kershaw, R.A.F.V.R.; G. C. O. Key; A. Paton; R. S. Sweet; H. E. J. Acfield; E. L. T. Barton, R.A.F.V.R.; F. Braithwaite, R.A.F.V.R.; R. L. C. Branson; C. M. Clementi; F. P. Cotterell; J. C. Cotton, R.A.F.V.R.; W. H. Flint, R.A.F.O.; C. J. T. Gardner, R.A.F.V.R.; R. G. Greaves, R.A.F.V.R.; P. Griffiths; J. Hutton, R.A.F.V.R.; R. McLean, R.A.F.V.R.; S. Muir; V. C. Otter; E. G. Parry; F. W. T. Pryer; G. W. Sawkins; F. St. L. Searl, R.A.F.V.R.; G. A. S. Watts, R.A.F.V.R., Sqn. Ldrs. A. H. Day; J. B. McKay, R.A.F.V.R.; H. V. Pexton, R.A.F.V.R.; W. W. Atkinson, R.A.F.V.R.; L. S. Chalmers, R.A.F.V.R.; J. S. Orr, J. F. Parsons, R.A.F.V.R.; G. F. Rogers; J. A. Stanbrook, R.A.F.V.R.; J. L. Warburton, R.A.F.V.R.; F. H. Whitaker, R.A.F.V.R.; G. T. Williams.

Capt. A. G. Lamplugh, British Aviation Insurance Co. Ltd.—C.B.E.

ROYAL NAVY.

O.B.E.

Lt. Cdr. (A) S. G. Cooper, R.N.

ARMY.

O.B.E.

Lt. Col. G. Hewetson, Army Air Corps.

DIPLOMATIC LIST

O.B.E. (Mil. Div.).

Air Cdr. the Hon. W. L. Runciman, Air Attaché H.M. Embassy, Teheran.

CANADIAN LIST

ORDER OF THE BATH (Mil. Div.).

C.B.

A.V-M.s W. A. Curtis; K. McG. Cuthrie; A. L. Morfee; G. V. Walsh, R.C.A.F.

ORDER OF THE BRITISH EMPIRE (Mil. Div.).

C.B.E.

Air Comdres. J. G Bryans; M. Costello; H. B. Godwin; J. G. Kerr; W. A. Orr; A. D. Ross, C.C., R.C.A.F.

O.B.E

Group Capts. A. O. Adams; R. H. Foss; C. H. Greenway; J. A. Jones; D. Massey; V. S. J Millard; E. A. McNab; G. E. McCormick; T. K. McDougall; J. G. Stephenson; F. F. Tisdall; G. G. Truscott, R.C.A.F.

ROYAL RED CROSS.

ASSOCIATES.

Matron D. A. Bilton; Nsg Sister A. M. Laroque, R.C.A.F.N.S.

AIR FORCE CROSS.

Air V-M. J. L. Plant, R.C.A.F.

Mr. R. E. Bishop, Chief Designer, de Havilland Aircraft Co. Ltd.—C.B.E.

NEW ZEALAND LIST

ORDER OF THE BATH (Mil. Div.).

C.B.

Air Comdre. A. de T. Nevill, R.N.Z.A.F.

ORDER OF THE BRITISH EMPIRE (Mil. Div.).

C.B.E.

Air Comdre. M. W. Buckley, R.N.Z.A.F.

O.B.E.

Group Capts. C. C. Hunter; E. G. Moore. Wing Comdrs. D. C. Campbell; K. J. Crichton; P. A. Matheson; and I. A. Scott. Sqn. Ldrs. G. C. Ellis; A. B. Lindop; G. A. Tillson, R.N.Z.A.F.

AIR FORCE CROSS.

Wing Cdr. R. A. Kirkup; Sqn. Ldr. W. K. Paterson; Flt. Lts. A. S. Agar; W. R. Esquilant; J. T. A. Harris; J. S. Shephard; W/O. J. P. Wilson.

SOUTH AFRICAN LIS

ORDER OF THE BRITISH EMPIRE. (Mil. Div.).

O.B.E.

Lt. Col. J. D. Davis, S.A.A.F.

ROYAL RED CROSS.

MEMBER.

Jnr. Matron M. L. Blinck, lately S.A.M.N.S.

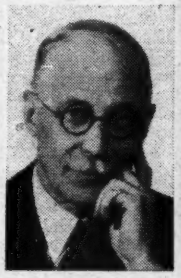
AIR FORCE AWARDS.

BAR TO A.F.C.

Lt. Col. J. D. Pretorius, S.A.A.F.

AIR FORCE CROSS.

Maj. S. van B. Theron; Maj. A. L. Bell; Maj. S. W. Murray. Capts. W. J. J. Badenhorst, A. Q. de Wet, J. P. Lambinon, G. H. McKay, T. E. E. Purchase, R. W. H. Simpson. W/O. L. A. R. de Chermont.



Sir Maurice Denny Bt., late President of A.R.B.—K.B.E.

H.M.S. IMPLACABLE RETURNS

THE aircraft-carrier H.M.S. *Implacable*, wearing the flag of Vice Admiral Sir Philip Vian, K.C.B., K.B.E., D.S.O., has returned to the United Kingdom after service in the Far East.

A sister ship of the *Indefatigable*, H.M.S. *Implacable* was laid down in 1939. Her earlier war service was in Northern waters where, as one of the ships of the Home Fleet, she took part in a number of important operations. One of the first being directed against the German battleship *Admiral Von Tirpitz*. Naval aircraft flown from the carrier located and photographed the *Tirpitz* in her hideout in Tromso Fiord.

In company with other ships of the Home Fleet, H.M.S. *Implacable* carried out a series of strikes against enemy shipping off the coast of Norway. During these operations upwards of sixteen ships were either sunk or seriously damaged and twenty-five less seriously damaged.

During service in the Far East, H.M.S. *Implacable* took part in the attacks on the Sakishima Gunto, when the B.P.F. covered the southern flank of the American invasion of Okinawa. Later, in what proved to be the final assault on the Japanese mainland, *Implacable's* aircraft struck at vital war installations on Kyushu.

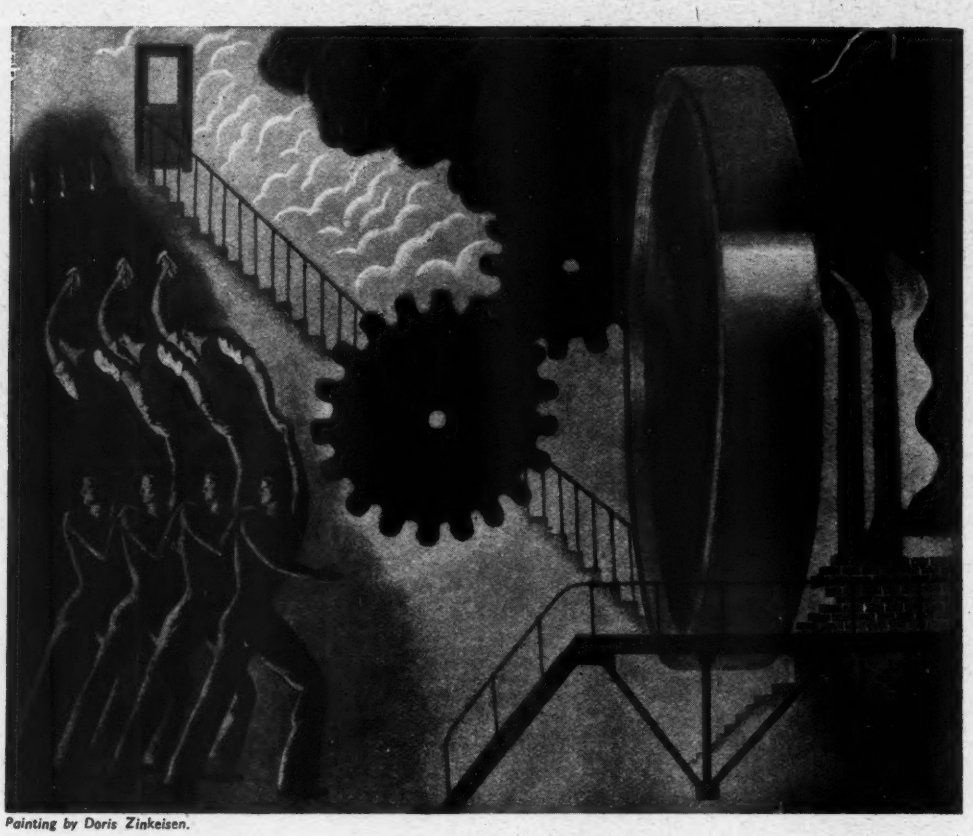
After the Japanese surrender, H.M.S *Implacable* was specially victualled and adapted to carry 2,000 released prisoners of war. Flying personnel, aircraft and flying equipment were removed and the hangars fitted to accommodate the men, who were taken to Sydney for passage to the United Kingdom.

DE HAVILLAND PROPELLERS

Only de Havilland propellers could have made possible the remarkable all-round performance of the de Havilland Hornet, with its wonderful Rolls-Royce Merlin engines. Top speed over 470 m.p.h. at 22,000 ft. Rate of climb 4,500 feet per minute. Still-air range 2,500 miles

DE HAVILLAND ENTERPRISE

DH
PROPELLERS



Painting by Doris Zinkeisen.

This Present Age . . 2

It is a proud record that there has been no major stoppage in the iron and steel trades during the last half century. The machinery of negotiation between management and labour is well established, but of greater importance is the readiness to use it and the faithful observance, by both parties, of its procedure and decisions. All controversial questions are discussed in an atmosphere of tolerance and sympathetic understanding, since the ultimate objectives of all are the economic prosperity of the industry, continuity of employment, and a progressive betterment of working and living conditions. The foreman is the first important step in management. He is promoted because of his intimate knowledge of his fellows and his skill and ability to instruct and control. Higher management in industry is now a salaried profession. It is open to all who possess a flair for human understanding allied with gifts of a high order, not the least being vision, leadership and powers of administration. Just as the chain of command in any army extends unbroken from the ranks to the Commander-in-Chief, so in an industrial organisation, the sequence from the workers through the foreman to the highest executive is equally important. Between all sections, the principles of equity and justice are the essence of our policy.

THE UNITED STEEL COMPANIES LTD

THE UNITED STEEL COMPANIES LIMITED

17, WESTBOURNE ROAD . SHEFFIELD 10

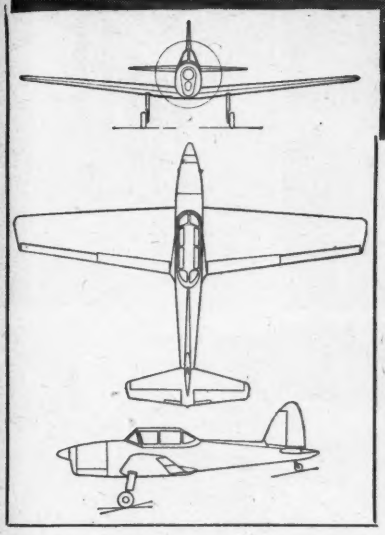
STEEL, PEECH & TOZER, SHEFFIELD
SAMUEL FOX & CO. LTD., SHEFFIELD
UNITED STRIP & BAR MILLS, SHEFFIELD

APPLEBY-FRODINGHAM STEEL CO. LTD., SCUNTHORPE
WORKINGTON IRON & STEEL CO., WORKINGTON
UNITED COKE & CHEMICALS CO. LTD., CUMBERLAND

THE ROTHERVALE COLLIERIES, TREETON
THE SHEFFIELD COAL CO. LTD., TREETON
THOS. BUTLIN & CO., WELLINGBOROUGH

RB U.S.P.34.

D.H. Chipmunk



INTENDED as a Tiger Moth replacement, some details of the Canadian-designed and built D.H.C.-1, or Chipmunk, were given in the issue of May 30th after it had completed its initial test flights at Toronto. The Chipmunk is being produced to meet the demand for a trainer of really modern layout, and is an all-metal low-wing monoplane with full aerobatic capabilities. Messrs. W. D. Hunter and W. J. Jakimuik, respectively the engineering director and chief designer of the Canadian de Havilland Company, have been responsible for its design. The first flight was made by Mr. Pat Fillingham, the chief production test pilot at Hatfield, who has been on a visit to Canada. The factory at Toronto is being planned for quantity production, and the design has been "engineered"—to apply a useful American expression—to this end.

The Chipmunk is actually lighter in empty weight than the Tiger Moth, and is about 40 miles an hour faster. Its all-up weight is 1,780 lb., and the maximum speed 152 m.p.h. with a Gipsy Major 1 c. Later D.H.C.-1s will have 160 h.p. Gipsy Major 30s, which should improve the performance considerably, and it is intended that, when in production, the D.H. manually-variable-pitch airscrew will be fitted. The D.H.C.-1 has its two seats arranged in tandem under a transparent canopy, but work is also proceeding on the development of a side-by-side seater cabin version, the D.H.C.-2.

From the Flying Clubs

Both the County Flying Club and the Leicestershire Aero Club are hoping soon to be able to re-start operations—presumably as a single club. Ratcliffe airfield has, we hear, been offered for civil use by Sir Lindsay Everard.

* * *

With two Auster Vs, and another Auster I expected at the end of this month, the Yorkshire Aeroplane Club is now in action and operating from Sherburn-in-Elmet airfield. The present flying rates are £4 10s. for dual, and £3 10s an hour for solo flying. The secretary's address is Lennerton Lodge, Sherburn-in-Elmet, Yorkshire (South Milford 317).

* * *

Before the end of this month the Strathtay Aero Club, operating from Scone Airfield, Perth, expect to have one Tiger Moth in use and a second will be available during the following two months. The dual and solo rates will be £3 15s and £2 15s respectively. The address of the secretary and treasurer is 1, Charlotte Street, Perth.

* * *

Although the airfield at Kingstown, Carlisle, is still "under requisition," there is a good chance that the Border Flying Club will be able to make a start during the coming month or two. This club has been allotted two Tigers and a Magister, and these are now being overhauled. When everything is under control a meeting will be held to settle the details of the re-formation.

* * *

During the past six weeks the Wiltshire Flying Club has been using a fleet of three Austers, but four more of this type and the Magister are expected to be in service shortly. The Royal Artillery Flying Club unofficially started operations on June 1st, using the Wiltshire Club's aircraft while their own are being prepared. The R.A.F.C. at High Post, by the way, is merely the Salisbury Plain branch. The club itself is by way of being a world-wide affair, and branches are to be started in India, the Middle East and Germany.

* * *

The Derby Aero Club have now started operations with an Auster, while a Miles Monarch, another Auster and three Magisters are at present being overhauled and should be available by the end of this month. The rates are the same for dual and solo flying—£4 an hour, with the reduction to £3 10s an hour for "contract" flying. The accommodation at Burnaston airfield, Derby, will eventually be ample, but it is, at the moment, "awaiting decoration after derequisition."

* * *

Towards the end of July the Airwork Flying Club hope to be able to restart operations from Denham airfield. Tiger Moths will be used.

* * *

The Oxford Flying Club will be restarting on July 1st at Kidlington airfield. The initial fleet will consist of a Gipsy II Moth, a Tiger Moth and an Auster, while a second Tiger will be available in August. The flying rates will be the same as those charged at the associated club at Fair Oaks—£4 for dual and £3 an hour for solo flying. 73 octane fuel is already available at Kidlington, where private owners are welcome and where there is ample hangar accommodation. The address of the club, which is operated by Airtraining (Oxford), is Campsfield House, Kidlington Aerodrome, Oxford.

TWO CONTINENTAL RALLIES

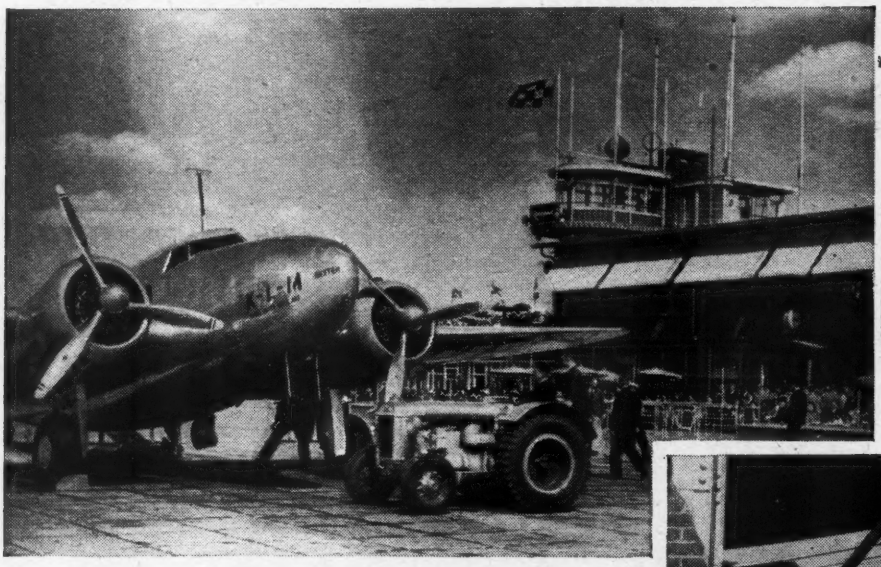
ON June 29th and 30th the Aero-Club de Suisse is organising an air rally at Blécherette airfield, near Lausanne. This, the first Swiss flying meeting since the war, will be on an international scale and British private owners and manufacturers are invited to take part. The address of the club is Aerodrome Civil de Lausanne, Switzerland.

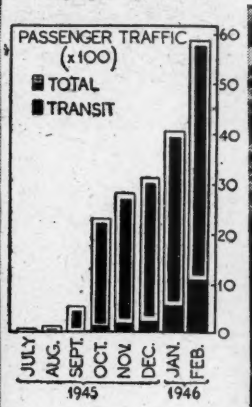
A week later, on June 6th and 7th, the Aero Club de Touraine is also organizing an air rally at St. Symphorien airfield, Tours, where custom and currency exchange facilities will be arranged. The entrance fee will be 2,000 French francs for each person, and this includes the cost of an overnight stay at an hotel, of lunch, of the official dinner and a "tasting" visit to the local wine vaults. Further details can be obtained from the Aero Club de Touraine, Chambre de Commerce, 2, Rue Berthelot, Tours, France.

NETHERLANDS TERMINAL....

Amsterdam's Famous Airport at Schiphol, Wrecked During the War, Re

Photographs by K.L.M.

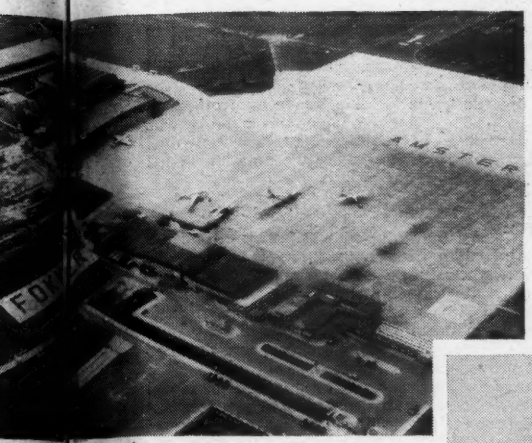


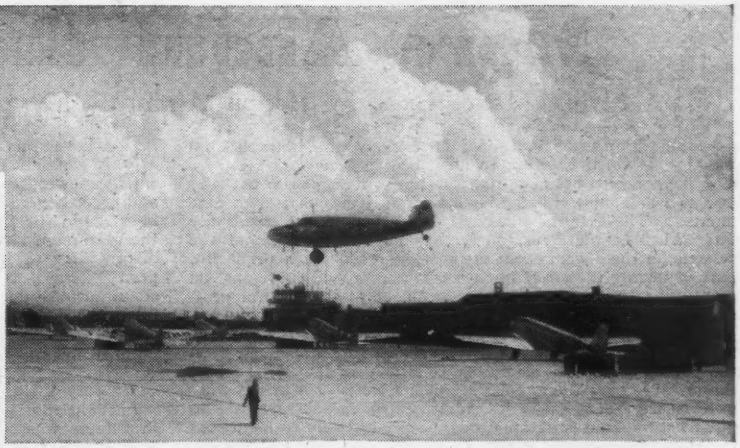


Before the war, Schiphol was famous not only as an airport, but, in accordance with Continental tradition, became well-known, too, as a centre of social activity. Above is a scene typical of Schiphol before the war showing, in the foreground, a K.L.M. Lockheed Fourteen, and behind it the well-patronised terrace of the airport building.

A great deal of effort has already been expended on the reconstruction of Schiphol. The airport has now returned to its former life even if not to its former glory, as can be seen from the above photograph of the aircraft parking area. In the foreground are K.L.M. DC-3s and behind them can be seen four K.L.M. DC-4s parked in line-astern. The picture on the right gives a general aerial view of Schiphol's terminal area as it is now, showing the primitive wooden huts which comprise the station buildings and, in the left foreground, two hangars in course of construction. The task of rehabilitating Schiphol is an immense one.

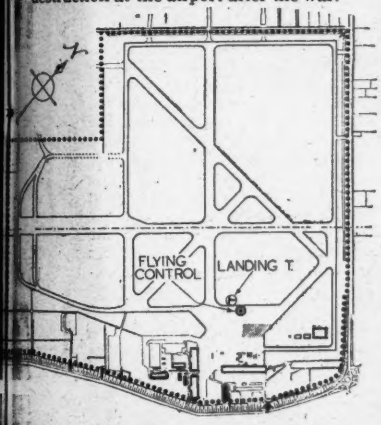
War, Returns to Life

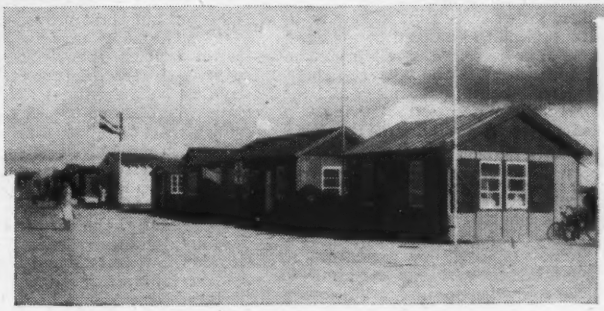




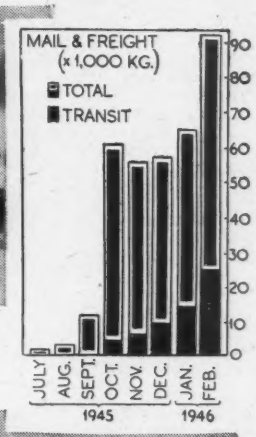
Left is an aerial view of Schiphol, taken before the war, showing the layout of the terminal area. Amongst the aircraft parked on the tarmac two DC-2s and a Ju-52 can be seen. Above is another pre-war picture.

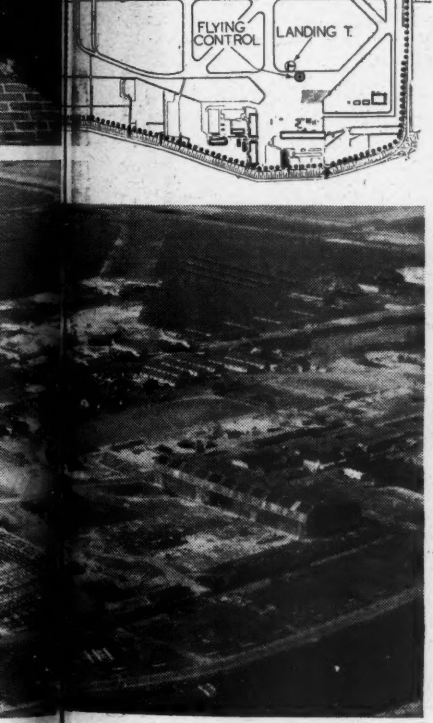
The photograph on the left, gives an indication of the extent of the destruction at the airport after the war.

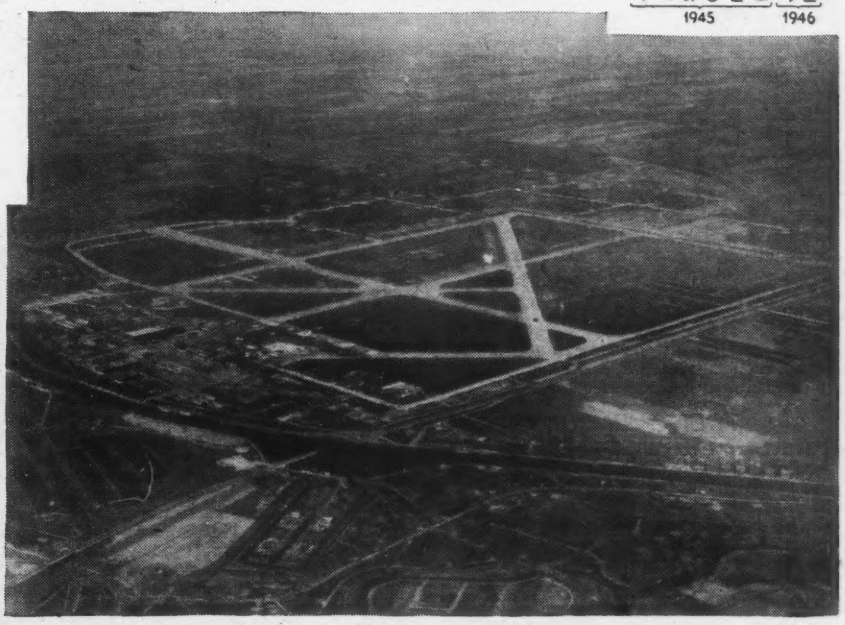




This line of wooden sheds is known as "Liberty Street". The sheds house, for the time being, the airport managing director and the essential airport services. They also provide accommodation for passengers and luggage.







Above is an aerial photograph of the runway and general airfield layout which can be compared with the plan alongside it. By November, 1945, six months after liberation, the entire runway system had been repaired and was ready for use. Schiphol, which is the world airport for the Netherlands, is about six miles from Amsterdam.

More About the P-92

Flying Model Built by Heston Aircraft : Many Problems Overcome

SOME interesting additional facts about the Boulton Paul P-92—which was briefly described in last week's issue—have been obtained from Heston Aircraft, who actually designed and built this interesting aircraft in a matter of nine months. The external lines and dimensions of the eventually intended full-scale F.11/37 were taken as a basis, and the reasons for the development of the scale model were, primarily, that of testing the effect of the large cupola, with its guns, on flight characteristics, and the assessment of the general prospects of a long-range escort fighter.

In traversing, the guns might have been expected to change the airflow conditions over the tail, with consequent effect on the aircraft's stability as a gun platform. In the flying model the pressure over the cupola and over a large part of the wing were to have been plotted. Additionally, it was necessary to discover, by scale determination, the power likely to be needed to rotate the cupola.

Needless to say, the model could not be scaled down everywhere with entire accuracy. Heston Aircraft were unable to obtain a half-scale pilot, and the forward fuselage had, consequently, to be enlarged. Even though enlarged, it still fitted the test pilot, Flt. Lt. Feather, rather more than closely as he sat on the floor. Special attention had to be paid to the cowling shapes of the Gipsy Majors in order to obtain a fair simulation of the Sabre installation to be fitted in the full-size fighter. Normal Gipsy cooling arrangement was impracticable, and the air was ducted into and through the undercarriage fairing.

A number of minor problems were encountered during detail design development. For instance, it was found difficult to arrange a practical spar in the tiny sections at the aileron tips. There was trouble, too, in installing the test manometer panels and recording camera. For this a special access hole had to be made in the fuselage, and this hole "demolished" most of the semi-monocoque fuselage. Again, means had to be found of providing the pilot with necessary emergency egress. This problem was solved with the help of a single control which simultaneously released a large fuselage panel and collapsed the pilot's back rest. Had it been necessary for him to bale out, he would have fallen backwards and then rolled and wriggled his way sideways out of the aircraft.

Good Characteristics

In flight the P-92 turned out to be almost faultless, and the test flying was completed in three hours. Some trouble was experienced with over-lightness of the rudder and elevators, but it is probable that, in any larger aircraft, the heavier loads would have balanced the situation. The controls were, in fact, merely too light to be comfortable. Because of anxiety over the pronounced taper of the wing, built-in slots were fitted to the P-92, but these proved to be unnecessary.

It was in many ways unfortunate that, even before the model had been flown, the Air Staff decided, on tactical grounds, not to proceed with the project. Certainly in the earlier stages of daylight bombing by the U.S.A.A.F. a good long-range escort fighter might have helped to save this force from considerable punishment.

THE PARIS SHOW

FROM all we hear it would seem that the British aircraft industry is likely to be very strongly represented at the first post-war Paris Aero Show. It would be premature to give the numbers of the firms taking part and certainly to give their names, but, all being well, the British section should be a worthy one. The show is being held, as before, in the Grand Palais, Champs-Élysées, and its annex, between November 15th and December 1st, 1946.

G.A.P.A.N. CEREMONY

ON Monday, July 1st, 1946, the Ceremony of Installation for the Master, Deputy Master, Wardens and Court of the Guild of Air Pilots and Navigators is to be held at the Royal Aeronautical Society, 4, Hamilton Place, W.1. Members of all grades are invited, and dress will be lounge suits or uniform. Unfortunately, because of the limited accommodation, official guests only can be invited. A reception will be held after the ceremony.

THE ELSTREE DISPLAY

IN threatening weather the United Services Flying Club made a brave and, within the limits of the climatic situation, a successful attempt to interest several thousand people at Elstree airfield on Whit Sunday afternoon. There were gliding and soaring displays, and a return to the old days with a bombing-the-car competition—using, in deference to Mr. Strachey, soot-bags in place of flour-bags. The crowd was duly excited by Mr. de Greeuw's two parachute drops (the second, incidentally, his 180th) and by an R.A.F. Meteor which exhibited itself at high speed over the field.

YOUNG ENCOURAGEMENT

THIRTY-THREE flights from London to the Channel Islands are to be given as prizes during the summer holidays in a competition for junior members or prospective members of the Air League of the British Empire. A sum to cover the cost of this air excursion has been provided by the Duke of Sutherland. The competition will be literary in nature. The closing date is July 16th, and entry forms can be obtained from the Air League at 1, Pall Mall East, London, S.W.1. Those who are already junior members need not apply for forms, since these will be sent automatically.

DEAUVILLE AGAIN

AN invitation has been received by the Royal Aero Club to assist in the organization of the Deauville Rally which will be held between July 13th and 15th. Club members are being informed of the details of this Rally, which was very popular in pre-war years.

Incidentally, the Customs Carnet system is now in force in Belgium, France, Great Britain, Denmark, Spain, Czechoslovakia, Switzerland and Holland. This information was given at last month's meeting of the F.A.I. in Paris, when the decision was taken to bring Air Touring Cards into use as soon as possible. National flying clubs were invited to consider the provision of car facilities for members on international tours and to organize accommodation. Mr. Whitney Straight was elected Vice-President of the Touring Commission.

Approval was granted to five point-to-point records in the name of Great Britain: London-Cape Town; London-Port Darwin; London-Wellington; London-Montreal; and London-Karachi-London.

PRUDENCE TO CONFOUND PRUNE

PILOT OFFICER PRUNE has become a likeable national character, but his qualities of irresponsible stupidity are a menace in anyone else, and "pruneries," particularly among the aircrew fraternity, were a matter for grave concern amongst Air Force authorities long before P/O. Prune was commissioned.

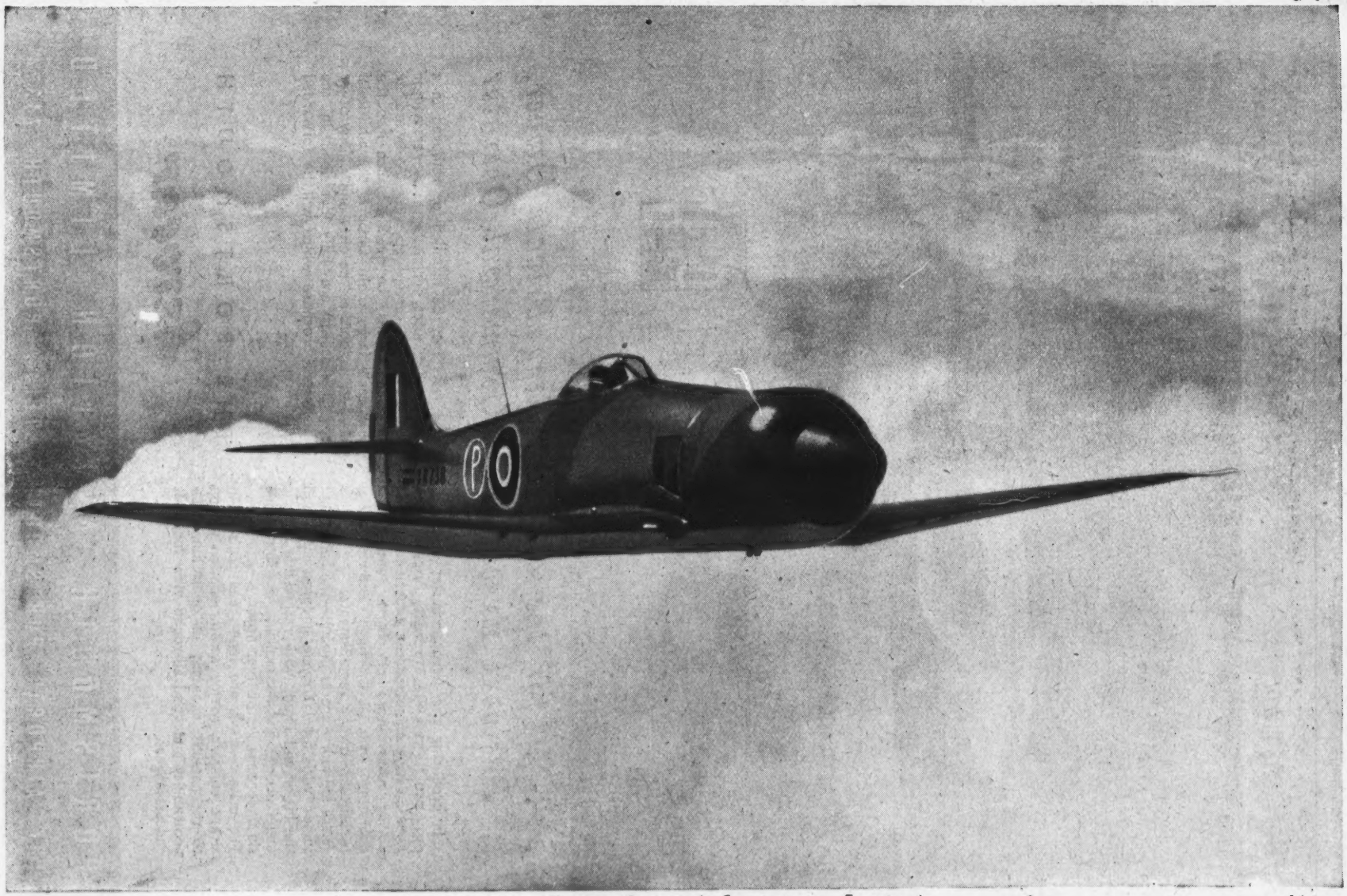
On the assumption that Prunes are at least human, and that there are soft points somewhere in their leather skins, moss-grown ears and ivory skulls, a subtle approach has been devised by the Aircraft Accident Prevention staff; a new kind of appeal has been introduced in the form of a charming young blonde.

The young lady, Prudence by name, who has graced certain posters for some months, has now become a living influence as a result of a forty-minute film, "Flying with Prudence," which is being circulated for all R.A.F. flying types to see.

Under the direction of Cecil Musk, an amusing little story has been dramatized in which Prudence (Miss Patricia Cutts) accompanies a Transport Command crew on a flight East. It is breathed that a V.I.P. is travelling incognito on the Avro York, and, in fact, Prudence, whose name does not appear on the list of passengers, plays, during the flight, a blithe spirit cum guardian angel rôle for the captain, Derek Elphinstone, and navigator Rex Gardner.

The Director of Accident Prevention, Air Commodore A. C. H. Sharpe, D.S.O., explained before the film preview last week that his directorate wanted to sell something, and his wares—aids to safety—had therefore to be offered in an attractive form.

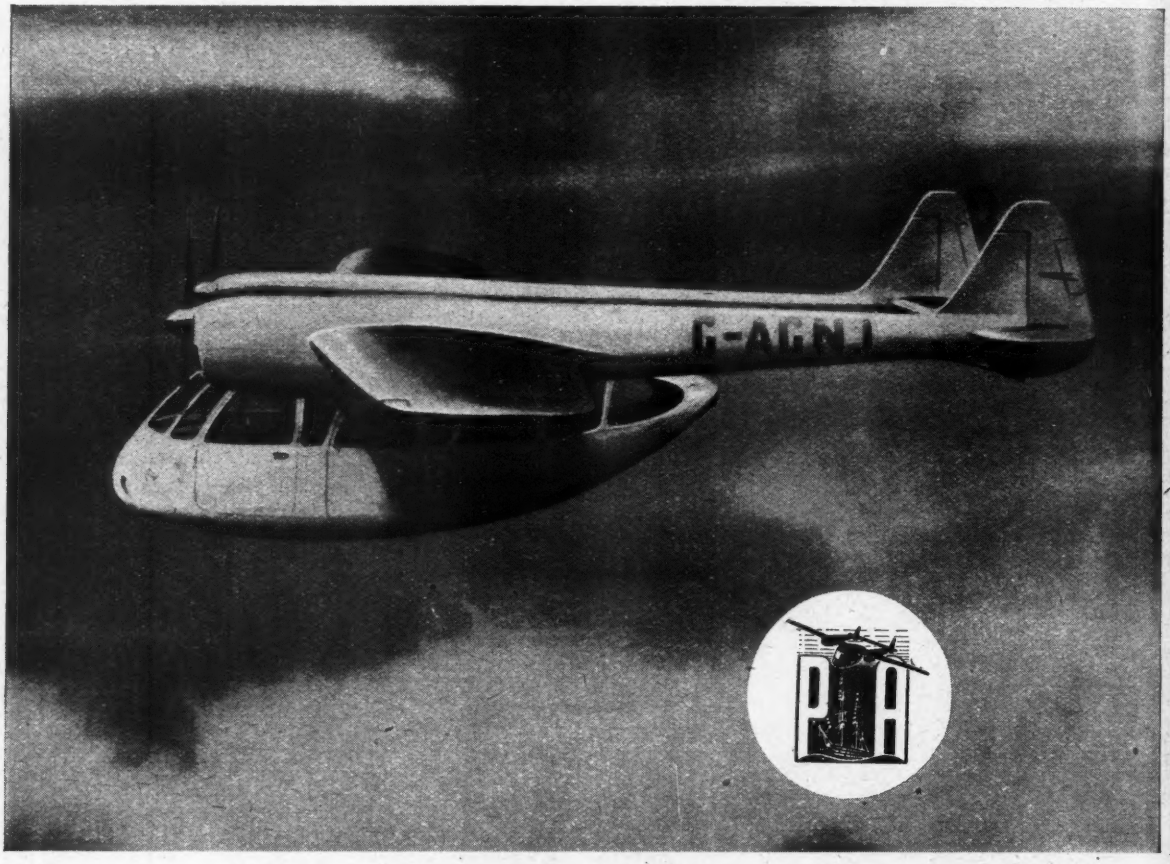
There is no doubt that this first of a series of films will appeal to the R.A.F. and will be more effective than a cupboard full of printed orders. The Accident Prevention Directorate could do worse than issue photographs of Prudence as a pin-up girl for inclusion with lists for cockpit drills in all aircraft—R.A.F. aircrews do have their weaknesses!



Hawker Sea Fury (*Bristol Centaurus Engine*).

[Advt.

STREAMLINED SPEED AND COMFORT . . .



. . . for the discriminating Private Owner, Business Executive or Commercial Operator

In producing the Aerocar Series of multi-purpose light twin aircraft, Portsmouth Aviation have combined the experience gained during many years of charter and airline operating with a thorough knowledge of present-day owner requirements.

There are four Aerocar Models—the Senior and Junior with fixed tricycle undercarriages and the Major and Minor with retractable tricycle undercarriages and also available with retractable ski undercarriages or fixed floats.

The main features are high-speed cruising in airline comfort, roomy accommodation for up to six persons, economy of operation, auto-accessibility and good all-round view for pilot and passengers.

The seats may be installed or removed in a matter of minutes, permitting passengers and/or freight to be carried at will. Awkward or bulky goods may be quickly loaded into the Aerocar's large cabin through the additional clam-shell doors at the after end. Many other special features are fully described in the illustrated brochure which will be forwarded upon request.

THE PORTSMOUTH

Aerocar

PORTSMOUTH AVIATION LIMITED

THE AIRPORT, PORTSMOUTH. TEL.: PORTSMOUTH 74374

American Newsletter

Free Enterprise Goes Ahead : Learning the Hard Way : Unanswered Criticisms : How We Appear to the U.S. : The Northrop Bomber

By "KIBITZER"

ONE of the most remarkable developments in the history of commercial aviation is now taking place in the States. The fact that the circumstances which have brought it about result from the post-war situation, and could not have arisen at any other time, does not lessen its importance.

In the last six months, literally hundreds of itinerant operators have sprung up in the States, and begun various non-scheduled services. The pilots, crews, and often the entire personnel, are ex-U.S.A.A.F. or Navy. Some have good financial backing; some have only their pensions or gratuities. Nearly all have bought ex-Air Force machines, ranging from DC-4s to Cessnas. All have hope. They will carry anybody and anything from any place to anywhere. Already some of the freight loads have been extraordinary. A prize bull from Texas to Africa; lobsters from Nova Scotia to New York; and perishable, locally-caught or grown foods from country to consumer. Some of the names of these new concerns also show imagination: Air Cargo Transport; Air Express; Caribbean Atlantic Air Lines; Coastal Tank Lines; Hiawatha Airways; Fireball Express; Meteor Air Transport; and Veterans Air Lines.

That it was possible to start this type of business at all was due to two facts: The men and equipment were available in large numbers, and non-scheduled services do not need to be licensed by the Government. Such companies as these were free to fly how and where they liked. That they were able to keep going financially throughout the winter was also due to an exceptional set of circumstances.

Air-travel Boom

The regular scheduled airlines, who must lodge their requests to operate their routes with the Civil Aeronautics Board, and from that Board receive approval before they can start, have, since V-J Day, been desperately short of equipment. Surplus Army DC-3s and DC-4s have been bought, but have had to be converted for civilian-passenger use before they could be used. This meant that the regular airlines could not, for lack of seats, handle the available business. A travel-crazy America, with too much money to spend, has demanded to be taken to holiday resorts like Florida and California, and the travellers haven't cared how they went or what it cost. The result was a terrific boom for anyone with an aircraft for hire. Even now, and during the rest of the summer, it seems probable that these new companies will continue to make money—or, at least, to break even. But when winter comes spring may, in this case, be too far behind. For, by then, the established airlines will have more and bigger aircraft. Fares will probably be reduced and schedules increased, and facilities will be available which the charter companies simply cannot afford to give. Then the trouble will start.

It must not be thought that these new companies are irresponsible, or that their maintenance and flight supervision is bad. That is not the case. The enormous amount of flying that they have done and the very few accidents recorded against them shows that they take their job seriously and do it well. Personally, one wishes them every possible success. They represent the best type of young and adventurous free enterprise. But many will not be able to stand up under the bitter competition that such free enterprise develops. The experience of two tours of duty over Germany or Japan is not much help when good management and business experience will make the difference in the colour of the balance sheet. Some will see the red light and will close down. Some will struggle along before going completely broke. Some will amalgamate and start afresh.

A few, perhaps very few, will develop into big-time operators. But of these last—the last of the hundreds who now crowd every municipal airport in the country—will be born a new generation of airline operators. They will have learnt things the hard way. They will be pretty tough customers when they expand into the international field. They will be worth watching.

Peacetime Pinpricks

Nearly every Englishman who was in the States during the war questioned, generally with great vehemence, the wisdom of our policy of never answering back when British actions were criticised and attacked in the American Press. There were, and still are, publications over here which take a delight in sniping at the British Empire, and when this is combined with an intentional subjectivity in reporting and a tendency to exaggerate and to sensationalize, the results are hard to take. But whatever may have been the wartime attitude, a little plain speaking can't do any harm now, and as aviation is so often a bone of contention, one might do worse than examine three criticisms (two of which the writer considers to be unjust) that have been levelled at the British during the last few weeks. If criticisms are not refuted, they are apt to become crimes, but if, by ventilating them, a sense of proportion is restored, some good will have been done.

The first accusation is that the British Government should not exert influence over airlines in the Dominions and elsewhere by taking a financial interest in such ventures, and that by so doing American interests, being of the "free enterprise" type, are suffering at the hands of nationalization. The logic of this argument is pretty thin, but arises from the strong, and often repeated, American belief that free enterprise is sacred, and must never be subjected to competition from monopolies—whether nationalized or otherwise. The writer has no quarrel with this doctrine, but fails to see how the British Government's action, even if it is implemented through a nationalized instrument, such as B.O.A.C., can be classed as monopolistic. The other parties to the agreements generally seem to hold the bulk of the capital. Surely, there is not much difference between this and T.W.A.'s infiltration into (and I quote a list of countries given in a statement by a T.W.A. executive) "the Civil Aviation activities of Ireland, France, Italy, Turkey, Saudi Arabia, Iran, Hawaii, Philippines, China and throughout areas in Central and South America." (As a matter of interest, the State Department has now stated that it does not support the contract which T.W.A. has signed with the Italian Government.)

Selling Fighters

The next thing that seems to have caused alarm and despondency, perhaps understandably, is the sale, by de Havillands, of Vampires and Goblin engines to Sweden. This has been treated as though it were a breach of some unwritten law that would forbid either of our countries to make modern fighters or engines available for export—presumably for security reasons. It may be true to say that the State Department here has refused to permit some of the American manufacturers to sell their newest fighters abroad, but, if so, it is difficult to understand quite why. The talk of security does not make much sense, as there has been a wide publication of most of the details of both

AMERICAN NEWSLETTER

British and American products in this class, and the P-80 is not so modern, anyway. So far as jet engines go, of course, it is certain that our advanced state of development of these units, compared with those in the States, would have got us this business anyhow. But if security is really the basis for feeling as they do, one would remind the Americans of their sale of Rolls-Royce-engined Mustangs to Sweden while the war was actually on.

The last argument arises from the present arrangement whereby the British Government is using the currency restrictions in such a way that British nationals benefit in the amount of foreign currency available to them if they use a British airline. In this case the writer feels that there are grounds for criticism—but not for the same reasons that prompt those from this side. The British Government has the right to apply its monetary restrictions as it thinks fit. The real point at issue is why it should be necessary to offer the British public any inducement to travel British. They should do that anyway. Our services should be as good as, or better than any other, and the Government's action is perhaps a suggestion that this is not yet the case. Having travelled on a large assortment of airlines, the writer knows that we have the ability to give a service and reliability that is absolutely second to none. It is this, not bribery, which should make the public patronize the British lines. Let us be allowed to utilize our ability.

U.S. Stocktaking

No apologies need to be offered for the reproduction of an editorial which appeared in the *New York Times* on May 3rd. The similarity between these remarks and some of those made by the writer and other British observers of the American scene in the British Press is not pure chance. This is how the situation looks to those of us who are over here.

Such expressions of opinion are unpopular with certain members of the British aircraft trade. That is understandable. Nobody likes criticism, or comparisons where one is the sufferer. The writer is the first to bridle at such comparisons. But, however unpleasant the facts may be, the British aircraft industry must understand the kind of thinking and the type of competition that they are up against. It is for this reason only that the remarks are reproduced here—even although it may not do the British industry full justice and may boost certain American types which are not as good as their British counterparts. An appreciation of the other fellow's outlook is the best basis on which to found a competitive policy.

"COMPETITION IN THE AIR"

"The tears of those who weep for the future of the United States in international civil aviation seem unnecessary. Let us, for a moment, compare our situation with that of Britain. An analysis by the Society of British Aircraft Constructors of present and future types of British commercial aircraft has recently become available. The Society, anxious to promote the sale of British aircraft abroad, is not notable for the moderation of its claims. Yet, with all due deference to the plight of British aircraft manufacturers committed to the desperate and glorious defence of the home islands by building fighter aircraft while we built transports during the war, they have nothing to offer. Britain herself has been forced to this conclusion in the hard-bitten race for business over the Atlantic. In July she will reopen her services with American Constellations.

"Next year she will introduce the Tudor I. It is not quite as efficient as the Douglas DC-4, which was designed in 1939 for domestic service and which magnificently filled the gap in overseas services for military and civil air transport alike. Yet already this aircraft is being displaced by the Constellation. Against the Constellation, in the air for two years, the British have the Tudor II to offer, and it has not yet been even test-flown.

"Following the Constellation we have the Boeing Stratocruiser, the Republic Rainbow, the Lockheed Constitution, the Douglas DC-6 and DC-7, the Consolidated-Vultee 200-passenger giant, and even the long-range Fairchild Packet for freight. All of these have either proved performance in the air as military prototypes or are projections of proven designs. Against them, and probably to appear later than they, the British have only their Brabazon I. It is as yet merely an eight-engined idea for which its projectors claim but 250 miles an hour cruising speed, as against 400 miles an hour for many of these American types.

"Pan American Airways long ago—to its credit as an exemplar of American know-how in the air, know-how in foreign business—and other lines since the war have demonstrated their ability to compete with the best the rest of the world has to offer. If we continue our research and development, as we must, there is no reason to fear for the future."

* * *

The Republic Rainbow, in its military form, has done quite a bit of successful flying and is said to be well up to expectations both in performance and handling quality. At the time of writing, it is doubtful if full pressurization has been employed, and there are sure to be headaches as soon as really high-altitude operation is begun. But one still sticks to one's forecast that, aerodynamically, this is likely to be one of the most efficient large aircraft flying to-day. Whether or not it will be economical to operate is another matter, and its popularity must in some measure depend on the demand for very high-speed travel. American Airlines are said to have ordered twenty, however, and they must know what they want.

Recently the Army released the first pictures and details of the Northrop Flying Wing XB-35. Up to the time of writing this aircraft, in conjunction with the other Northrop projects, has been surrounded with a nominal veil of secrecy. This form of dress is fairly common over here and results from a natural, if immodest, desire to show the world, coupled with a not-so-natural, but chaste, security. In the past the flying-wing fighter-types have shown an unhealthy tendency towards instability at slow speeds, with, sometimes, equally awkward characteristics at the stall. One hopes that the joyous acclaim with which the Press have announced the performance of this prototype will be realized during the flight trials. These initial Press releases could certainly lead the average citizen to believe that the success of "this bat-like bomber, which can carry more bombs farther and faster than any aircraft in history," was already proven, and the statement that it can ". . . get off the ground with sixty tons of bombs, and fly 10,000 miles with a 'substantial' bomb load . . ." should be enough to give any taxpayer a superiority complex for a week!

Whatever the Press may say about it, however, it is a most interesting and ambitious project and one wishes it every success. The flight trials themselves should yield a great deal of information and, if successful, will justify the brave decision to go ahead and build a revolutionary aircraft of this size straight off the bat. Its only predecessors were one-third-scale models, of which one or two were built and flown successfully.

FORTHCOMING EVENTS.

June 22nd.—Royal Society's Empire Scientific Conference; start of meetings at Cambridge.

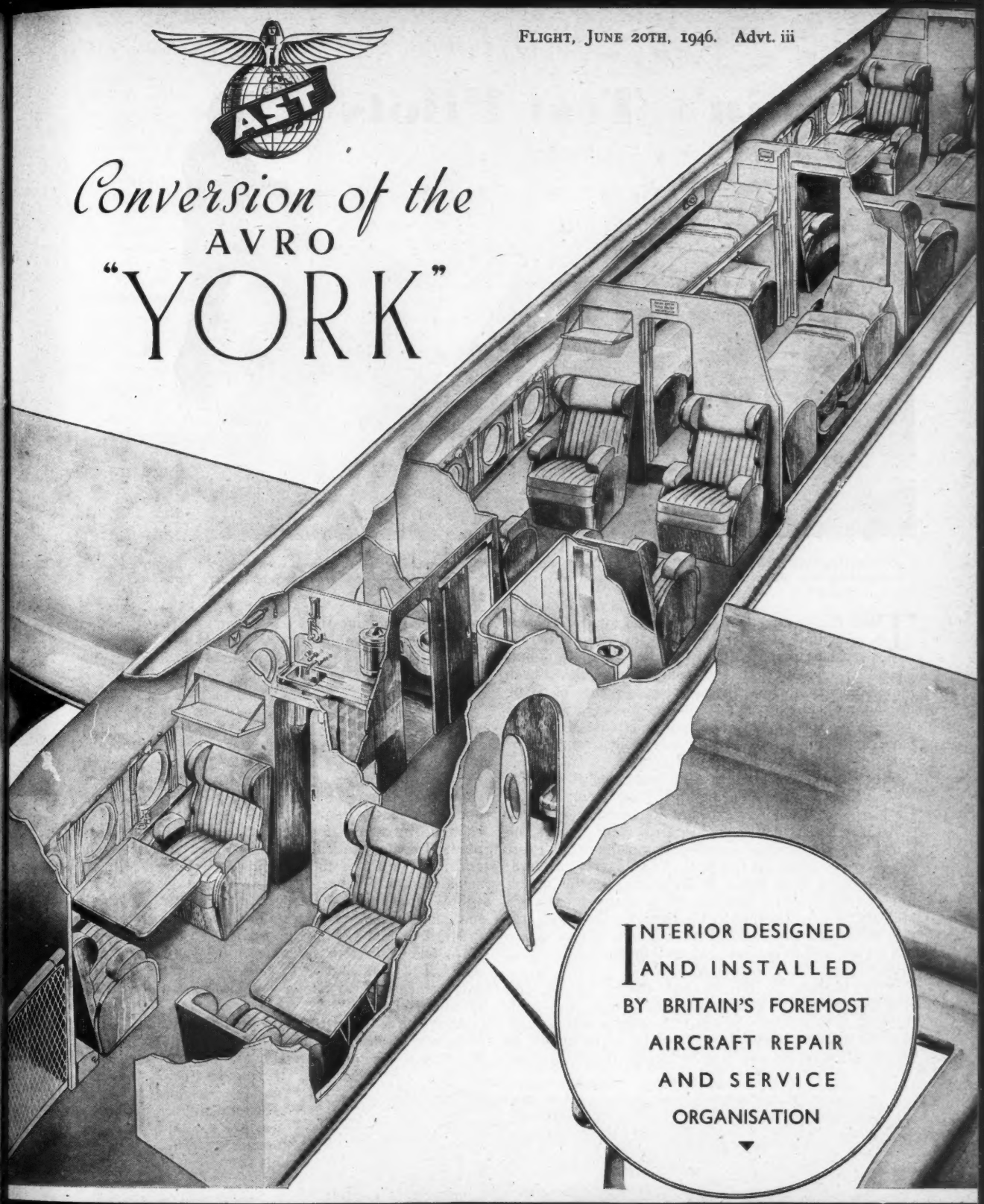
July 1st.—Royal Society's Empire Scientific Conference; first Oxford meeting includes "Modern methods of mapping and exploration by air."

July 9th.—Aero Golfing Society; meeting at the Royal Berkshire Golf Club, Ascot.

August 22nd.—Model Engineer Exhibition opens at the New Horticultural Hall, Vincent St., Westminster, London, W.1. (11 a.m.)

Sept. 9th.—Ministry of Civil Aviation demonstrations of technical radio equipment. More details pending.

Conversion of the AVRO "YORK"



INTERIOR DESIGNED AND INSTALLED BY BRITAIN'S FOREMOST AIRCRAFT REPAIR AND SERVICE ORGANISATION

AIR SERVICE TRAINING LTD.

(Aircraft Division)

HAMBLE SOUTHAMPTON · A BRANCH OF HAWKER SIDDELEY AIRCRAFT CO. LTD.

Britain's Test Pilots

No. 11. CAPT. R. T. SHEPHERD, O.B.E.

CHIEF TEST PILOT OF ROLLS-ROYCE LTD.

A CONTRAST IN TYPES: Capt. Shepherd in the cockpit of his Sopwith Camel when he was with No. 37 Squadron in 1918, and getting into the cockpit of a Gloster Meteor, which has five times its speed and probably about sixty times its power

THE life of an engine test pilot is totally different from that of one responsible for airframes. He must be prepared to fly anybody's aircraft, but, generally speaking, all the control bugs have been ironed-out first. Nevertheless, there is plenty of flying to be done before a new type of engine goes into general use. When it is remembered that the famous Merlin has more than doubled its power, it is easily realized how much development flying has to be done.

Capt. Shepherd is another of the test pilots whose roots go back to the rotary engine and "blip"-switch days. He learnt to fly on Avro 504s at Rochford in 1916.

An apprentice in the gun department of Vickers, he joined the Honourable Artillery Company in an effort to see service in the 1914-18 war. Vickers reclaimed him, but the local vicar acted as an accomplice by giving him a letter of introduction to a Major in the Air Ministry, which was then at the Hotel Cecil. Evidently this Major had pull. Shepherd was told to give notice to Vickers, and to pay no heed until he received instructions to report to Farnborough.

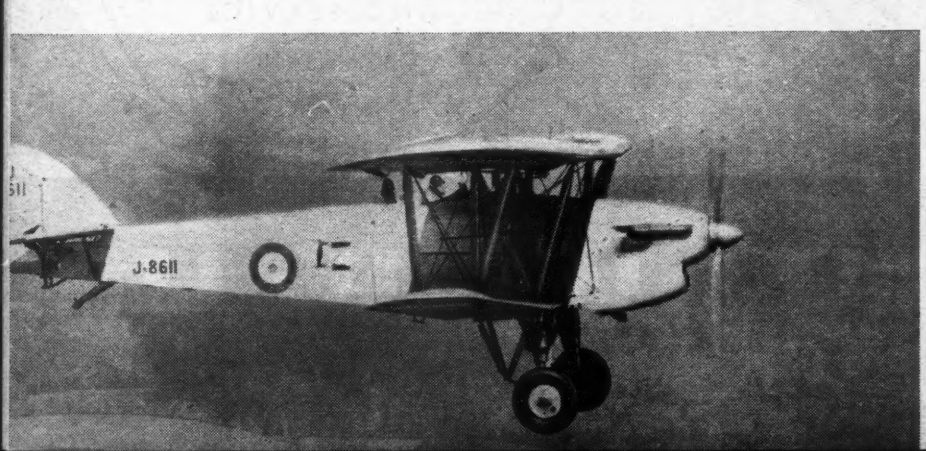
After learning to fly, he was posted to No. 102 (F.E.2b) Squadron at Marham in Norfolk, and from there went to France. About four months at the front in those days represented what became to be known as a tour in the recent war, and in March, 1918, Shepherd was posted to home service. He went to No. 37 Squadron, which was equipped with Camels, and engaged in the night defence of London against Zeppelin airships.

Service in Middle-East

When peace came he went to Biggin Hill for a while and then left the Service for eighteen months. In 1921 he took up a short-service commission and went to Egypt to join the famous No. 56 Squadron, which was then flying Sopwith Snipes. (It now has Rolls-Royce jet-engined Meteors.) The squadron was then disbanded and reformed in England, at Biggin Hill, with the exception of a special flight, which went to Turkey for a political demonstration. Shepherd was with this flight, and after returning to England his last flight with the squadron was a return to Biggin Hill in a formation of Grebes from the R.A.F. Display (I think it was called the Pageant then) at Hendon in 1926. He remained on the reserve, and in January, 1929, he took his B licence. He is one of the few test pilots to keep it current up to date. The qualifications of a Service pilot applying for a B licence in 1929 were a few oral tests and a glance at his log books!

At this time he heard a whisper about a flying school being opened near Reading, and after an interview with Mr. Powis, of Phillips and Powis, was appointed Chief Flying Instructor of the P. and P. School of Flying. The total aircraft on strength was one second-hand Moth, bought from Winifred Spooner, a pioneer private owner.

Strong-minded where flying is concerned, he did not see eye to eye with his employers in matters of flying



THE FIRST OF VERY MANY: Flying this prototype Merlin engine for the first time. It was installed in a Hawker Horsley.

AFTER FLYING IN: The Gloster Grebe after it had turned over lengthwise three times. The offending Brisfit (see text) stands serene and unconcerned in the background.

policy. After six months' service he left them in August, 1929, to join National Flying Services, who were then starting up at various airfields all over the country. For N.F.S. he was posted with one Moth and a ground engineer to run the Nottingham Flying Club at Tollerton. While he was still at Tollerton, Rolls-Royce asked Shep. whether he was prepared to do any experimental flying they might need done. In October, 1931, he made his first flight for them on a Kestrel-engined Fairey IIIF.

This arrangement carried on until 1934, when, with the expansion programme in the offing, Rolls-Royce decided to run their own flying establishment, appointing Capt. Shepherd as their Chief Test Pilot. This post he has now held continuously for the past twelve years. Flt. Lt. J. H. Haworth is his second-in-command, and there is a team of six test pilots.

NIGHT BOMBER: An F.E.2b of the type flown by Capt. Shepherd in the 1914-18 war. Two 112 lb G.P. bombs were carried on the undercarriage.

During these twelve years engine test-flying conditions have altered considerably. The change-over from biplanes to high-speed monoplanes affected power-plant design. Performance has made such rapid strides that most of the instrument readings now have to be recorded automatically by camera. Diving speeds, engine revs, radiator installations, all required their quota of development flying, and now the jet era adds a host of new problems. In the very early jet days the main trouble was creep (or lengthening) of the turbine blades. Engine life was in the neighbourhood of 10 hours, and the clearance between the blades and the casing was tested each morning with a feeler gauge. Another major jet trouble was that of surging on a climb, due to richness.

NEW GEN: A typical "knee pad" set of figures for a Meteor test. No aircraft characteristics appear on the sheet.

Although Shepherd did all the prototype flights on the Rolls-Royce Buzzard, Merlin, air-cooled X and Vulture (liquid X) engines, he did not make the first flights on the jets. The late Jerry Sayer, of Glosters, handled the E.28, and the Americans insisted on making the preliminary flight tests of the first Nene installed in a P.80. He was, however, one of the first pilots to flight-test the early Whittle jet engine installed in the tail of a Wimpey.

To listen to Capt. Shepherd, one would imagine engine test-flying to be an uneventful existence. He does, however, agree that he has now become somewhat of an expert at glide-landings, and that the very early Merlins were a trifle expensive in conrods. But with a firm of Rolls-Royce standing, major troubles are few and far between, and much of the development flying deals with what is known as "motor bike" troubles. In other words, to get an engine with all its bits and pieces and controls to work as well in the flexible structure of an aircraft as it did on a solid and rigid test-bed.

Trouble, however, can come from most unexpected quarters. On one occasion, when testing a new exhaust stub design (it was the kidney-shaped pepper-pot type), fuel collected in the stubs while Shep. was doing some inverted flying. As he turned the right way up, the whole lot exploded and set fire to the machine. Shepherd's clothes, including his collar, caught fire and so did his parachute, but he managed to beat out the flames as he landed the Hart with the fuselage still alight.

His closest shave, however, occurred way back in his Grebe days, and a Rolls-Royce engine was the indirect cause of the trouble. On that occasion he was in a flight of five Grebes of "Blueland" in the air exercises of 1925. A "Redland" Bristol fighter (250 h.p. Rolls-Royce Falcon) was seen to force-land. The leader took the whole flight of Grebes down to investigate, but failed to allow for some rising ground. Shepherd, who was outside man, flew straight into the deck, turned over endways three times—*and then stepped out*. He distinctly remembers the two separate cracks as each of the wooden airscrew blades broke.

With the advent of jets he feels that engines are, to a large extent, losing their individuality, but this is compensated for by the sweetness and quietness of the jets. If, however, the turbine-airscrew combination comes into its own, noise and vibration are likely to reappear.

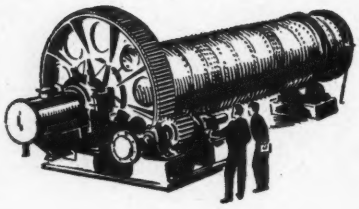
Capt. Shepherd divides his love of aircraft, and counts the Sopwith Camel, the Hawker Fury and the Gloster Meteor as his special favourites. His log books show 77 different types of aircraft and 7,280 hours flown.

He is now busy starting a gliding school for the A.T.C. —he won't have any engine trouble there. J. Y.

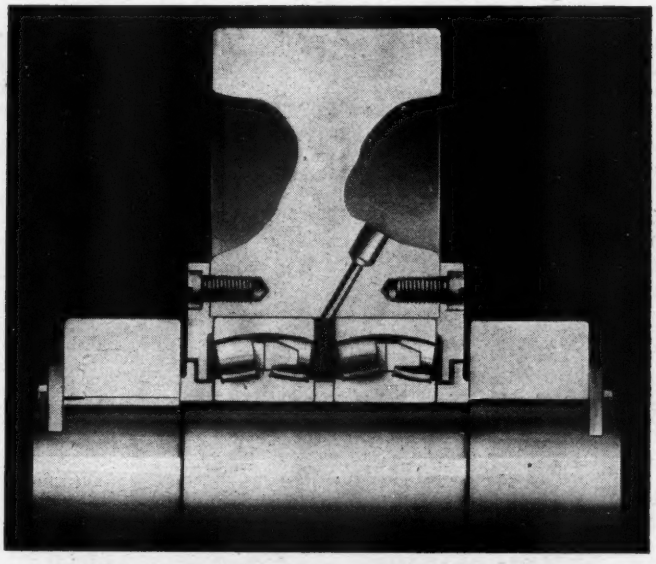
TWO HEADS ARE BETTER THAN ONE

Improving an accepted principle to reduce costs . .

To meet the needs of this specific problem the Skefko Technical Advisory Service evolved a simple adaptation of the Skefko self-aligning principle. By thus tackling the problem *before* it went forward into production, co-operation between our customer and ourselves resulted in greater efficiency and material saving in cost. The technicians of the Skefko Technical Advisory Service, men widely experienced in bearing problems covering all fields of engineering, are at the service of all machine designers to see that the right bearing is put in the right place.



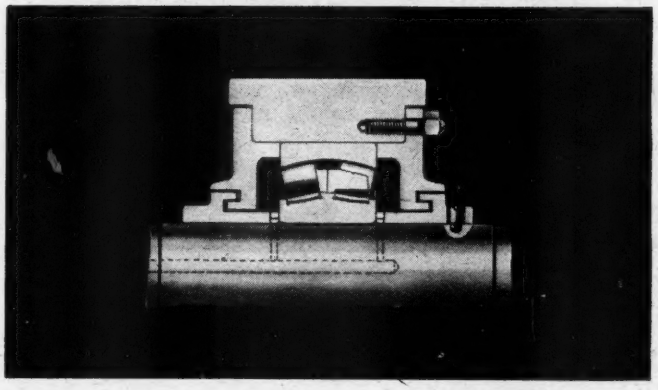
★ *This design is in common use in heavy support rollers, but it is necessary to ensure that the roller axes are parallel with the axis of the mill. This is somewhat difficult to achieve, so that heavy thrust and tilting forces are set up.*



New SKF Design

★ *Realising the above difficulties we evolved the design shown where only one double-row self-aligning roller bearing is used in each roller thus obtaining a self-aligning unit which automatically compensates for any malalignment of the shaft axes in relation to the mill axis.*

This simple adaptation of the SKF self-aligning principle has proved very successful, and has resulted not only in eliminating unwanted thrust effects, but has effected a saving in cost, coupled with enhanced efficiency.



SKF BEARINGS

THE SKEFKO BALL BEARING CO., LTD. LUTON

The BRITISH MANUFACTURERS OF THE WORLD RENOWNED SKF BEARINGS

Superlift

Some Reminiscences of Stages Which Prepared the Way for the Supermarine 322

By Sqn. Ldr. HAROLD J. PAYN (R.A.F.O.)

FURTHER to the interesting article on "Variable Incidence," published in *Flight* on April 25th, 1946, concerning the success of this device as fitted to the Supermarine 322, some reminiscences may be recorded of experience which led directly to the proposal for the inclusion of variable incidence to meet the requirements of the Air Ministry Specification (S.24/37).

In 1923 the first experimental aircraft which embodied the Handley Page patent slot device was built and flown. This aircraft, the Handley Page Hendon,* a biplane powered with a Napier Lion engine, demonstrated on flight test that the slots, then mechanically operated, substantiated the claims made for them in respect of the generation of a greatly augmented lift by preservation of unstalled airflow over a much larger angle of wing incidence—an increase of some eight degrees above that attained on an orthodox plain wing.

SQUADRON LEADER PAYN has been flying since 1916, in the R.F.C., R.A.F. and as a test pilot for the Air Ministry and afterwards for Vickers (Aviation) Ltd. and Supermarines. As assistant designer and technical adviser to Mr. R. J. Mitchell, he continued to do occasional test flying, and he had much to do with convincing the authorities that the variable-incidence wing is worth while. The Supermarine 322 ("Dumbo") has proved him right, and here he suggests that the combination of variable incidence and slots may render really high-lift devices practicable.

The necessity to control this particular aircraft at such increase of incidence introduced new problems of stability and control, which were at that time not fully dealt with, but the slot invention as applied to the outer portions of the wing span on many types of aircraft has been developed to act automatically with success, improving lateral stability and control at stalling speed.

As the wing cellule of the Hendon was a fixed structure, the fuselage was presented at unusually large incidence to the oncoming airflow at the time when the slots were wholly operative. The fuselage at such attitude gave rise to two major undesirable characteristics, apart from the deterioration of pilot's view. One, a condition of increased drag of the fuselage, and two, the partial screening of the fin and rudder, resulting in a fall-off of directional stability and control at slow speed.

In addition, there existed a minor adverse effect owing to the low displacement of the aft side surface.

Slot Landing Technique

Concerning the increased drag of the fuselage, it was observed that in landing approach with engine off and slots opened it was necessary to give the aircraft a glide-approach speed higher than the normal proportionate amount above stalling speed required with slots closed, in order to obtain enough momentum effectively to flatten-out for landing, since the fuselage, when at large incidence in the latter stages, contributed appreciable unwanted drag, viz., too great a braking effect whilst flattening out. This could be counteracted by the use of a little engine, and the added slipstream also then improved control.

There is no doubt that the drag of the highly pitched fuselage seriously minimized the realization of the practical benefit of the fully slotted wing and masked to no mean extent the value of that invention.

The success of the fully slotted wing in the Supermarine 322 completely confirms this contention, and it is thought by the writer that the pioneer invention of the Handley Page fully slotted wing, together with flaps, has, for the first time because of combination with variable incidence, been presented in its best application, justifying all the initial claims of the inventor of slots.

In 1924 the writer had the opportunity of initiating and flight-testing a scheme which may be deemed to be a half-way stage in fuselage/wing incidence change. This scheme was incorporated in the Vickers Vagabond, a two-seater light aircraft fitted with a Bristol Cherub engine driving a tractor airscrew. This aircraft was designed to take part in a light aircraft competition at Lympne and was described in *Flight* of September 25th, 1924.

In the Vagabond the rear portion of the fuselage was hinged on an axis which passed through the lower longerons at the aft end of the pilot's cockpit bay. It was articulated through several degrees by means of screw-jacks fitted at the break of the top longerons, directly above the hinge axis. The chain-coupled jacks were operated by means of cable transmission from a small drum wtih handle beside the pilot. The extra weight involved was about seven pounds.

With the aft portion of the fuselage in the raised position, the favourable features attained were a good ground angle (with a short and small undercarriage), and good and definitely improved control right down to stalling speed. With the aft portion of the fuselage in the tail-down position, the top speed was well up for a biplane of this size and power. The change in trim brought about was favourable for the speed range.

It is of some interest to recall that there occurred in flight a condition (around 1.4 times stalling speed) where no load could be detected in the operation of the coupled jacks, other than slight mechanical friction of the gear. A speed was encountered where the end-load was zero.

This scheme had not the merit of preserving the pilot's view (of small account, however, in such a small aircraft) nor had it the more important merit of variable increase of slip-stream/wing-incidence as achieved in the fully-tilting wing, but it has proved to be a useful step towards the writer's conception and initiation of the application of the whole principle of variable incidence as carried out on the Supermarine 322, wherein the inclusion of Handley Page whole-span slots together with flaps show up to maximum advantage.

Regarding the application of variable incidence to flying boats, some incidental experience was gained in the course of flight trials made by the writer on a modified Supermarine Southampton flying boat in 1933.

One of the modifications carried out for flight test of the aircraft was that of having the whole wing cellule, complete with engines, etc., set at five degrees more incidence than normal to the standard hull datum and the tail-plane incidence range adjusted accordingly. In short, the setting of the hull was depressed five degrees.

With this experimental wing setting the take-off and landing conditions were improved in one respect, namely, that both could be made at lower speed than normally, whilst maintaining a hull/water attitude which was perhaps the optimum. But as the wing cellule incidence was not variable in relation to the hull in flight, this experimental setting, of course, gave the hull an adverse nose-down attitude at the high end of the speed range.

This experiment is recalled in that it confirms the suggestion put forward in the recent article published in *Flight* concerning the possibility of variable incidence being found worth while in its application to a flying boat.

*Actually the slot (fixed) was first demonstrated on a D.H.9 in October, 1920. The first service type to have manually operated slots was the Handley torpedo-carrier (1922).

CIVIL AVIATION

News of Charter Services : Northern Ireland Advisory Committee

MIDDLE EAST MARINE BASE : *Hungerford*, one of B.O.A.C.'s Hythe-class flying boats, flies over Cairo's tortuous back-streets before landing on the Nile at Rod-el-Farag, during the trip to Australia.

WHERE YOU MAY REFUEL

IN *Flight* of May 23rd, on page 525, we published a list of the airfields where fuel can be obtained by the civil pilot. Since then there has been an addition—Newtownards, near Belfast, where 73 octane is retailed by Miles Aircraft—while 87 octane fuel is now available at Portsmouth and 73 octane at Tollerton.

CIVIL AIRFIELDS DEBATE

ON July 1st, the subject of civil airfields which are still under requisition by the Air Ministry will be raised in the House of Commons in the Debate on the Adjournment by Mr. Eric L. Gander Dower, M.P. for Caithness and Sutherland. It is expected that such questions as compensation, non-return of buildings to their owners, and similar problems will be debated.

MORE AIRFIELDS AVAILABLE

ALTHOUGH there has been a recent addition of nine airfields to the list of those open for use by civil aircraft, all of these are, in some way, restricted. Five of them—Aldergrove, Jurby (I.o.M.), Leuchars, Manston and Turnhouse—are limited for use by aircraft operating on charter services and only after permission has been obtained from the C.O.; three —Carlisle (Kingstown), Croft (near Darlington) and Denham —may be used with permission; and the last—London (Heathrow)—is limited to use by aircraft operating on scheduled services.

NORTHERN IRELAND COMMITTEE

WHEN the Civil Aviation Bill becomes law, a Northern Ireland Advisory Committee will be established in order to ensure that Northern Ireland is provided with air services and airfields in every way commensurate with her needs. In announcing this in the House of Commons on June 6th, the Parliamentary Secretary to the Ministry of Civil Aviation stated that the decision had been made as a result of discussions between the Minister of Civil Aviation, the Minister of Commerce for Northern Ireland, Sir Roland Nugent, and the Chairman-designate of British European Airways, Sir Harold Hartley. Also as a result of these discussions, and after consultation with the Secretary of State for Scotland, it had been decided with Sir Harold Hartley's agreement, that the respective chairmen of the advisory committees for Scotland and for Northern Ireland should be appointed to the board of British European Airways Corporation when it formed.

AIR A.B.C.

FOR the first time, the "A.B.C. Air Guide" has been produced as a separate monthly publication, on lines similar to the A.B.C. Railway Guide. It contains an alphabetical world gazetteer showing how to reach each point from the U.K. and, in cases where direct schedules from the U.K. exist, it quotes times of services, fares, and baggage allowances. There is also a section giving the numbered time tables of the main trunk and important branch air services arranged in numerical order and including details of fares and baggage charges. Maps in colour of the main air routes are attached to the Guide. The A.B.C. Air Guide will be brought up to date each month, and is being published at 2s 6d by Thomas Skinner & Co. (Publishers), Ltd., of 141, Fetter Lane, London, E.C.4.

NEW YORK—LONDON—VIENNA

AS forecast in *Flight* a fortnight ago, Pan American World Airways inaugurated a direct air service between New York and Vienna via London, Brussels and Prague on June 15th. Constellations are being used for this service which is being run to a twice-weekly schedule and which is additional to the normal daily Panair schedules between New York and London. Aircraft leave New York on Thursdays and Saturdays, arriving at London Airport and continuing on to the Continent on Fridays and Sundays respectively. The fares from New York are: to Brussels £100; to Prague £112; and to Vienna £116.

ICELAND CHARTER

THE new charter service between Reykjavik and Copenhagen, which calls at Prestwick *en route*, is already heavily booked for the next two or three months. The first flight from Iceland took place on May 27th and aircraft belonging to Scottish Aviation, Ltd., are being used under charter to Iceland Airways. Liberators are operating over the Reykjavik-Prestwick section and DC-3s, converted to 21 seaters, are used between Prestwick and Copenhagen. At the present time the question of "fifth freedom" rights is under discussion between the Ministry of Civil Aviation and Iceland Airways, but nevertheless, passengers from the U.K. may use the Prestwick-Reykjavik section of the route, for which the single fare is £29.

CHEAPER FREIGHT

ON June 6th we quoted B.O.A.C.s new fares on the trunk route services to Cairo and beyond. The Corporation has now announced that the freight rates on these routes have also been reduced, and that freight intended for destinations between U.K. and Calcutta can be accepted without a Government priority. For points beyond Calcutta, the sponsorship of a Government department, or of the office of a Dominions High Commissioner is still required.

The new rates are in some cases less than half the old ones; for example, freight to Cairo now costs 6s 6d per kilogram instead of 17s, and to Baghdad 8s instead of 20s 8d. The rate to Sydney has been reduced from 61s 10d to 41s. 7d.

NO PRIORITIES

AN air service on which over 400 crossings of the South Atlantic had been completed prior to the war is being resumed on Saturday next, when the Air France weekly schedule on the U.K.-South America route begins again. Skymasters will be used and they will start from Paris, making stops at Dakar and Recife *en route* to Montevideo, Rio de Janeiro, Buenos Aires and Santiago. Air France services from London, Glasgow and Manchester will connect with the Skymaster at Paris, and when the company introduces a new schedule next month, Dublin, too, will be linked with this South American service.

Passengers will *not* require priorities on this service, and

so bookings can be made in the normal pre-war manner of "first come, first served." Similarly, priorities do not obtain on the Air France Skymaster service to Cairo, which began operating on June 13th.

As described in *Flight* on March 28th, the former railway station *Gare des Invalides* has been converted into an airways terminus for Paris, and is now in use as such by Air France.

TRAVELLING MAINTENANCE

WITH the idea of offering maintenance service to private owners of aircraft which are based well away from normal facilities, a new concern, Personal Plane Services, c/o Braylea Fisheries Estate, Bray, Berks, has appeared. The firm's intention is to carry out 25-hour inspections, top overhauls, or minor repairs at a fixed cost on the owner's premises. Licenced engineers will pay visits with a mobile workshop, and the aim is to provide a 24-hour service.

P.I.C.A.O. JOURNAL

WE mentioned, in our issue of May 9th that an explanatory booklet had been published by P.I.C.A.O.—*What is PICAO?* Now, we have received a more ambitious publication from the same source. It is Number 1, Volume 1, of the "PICAO Journal" which is to be published regularly in order to record the activities, studies and projects of P.I.C.A.O. and—in due course—of its permanent successor. This first issue is concerned mainly with the general structure of the organization and of its administration, and covers such matters as the rules of procedure for the Council and its committees, regulations for the staff and for travel, and a general budget estimate up to July 1st next.

One interesting feature is the inclusion of the salary scale for P.I.C.A.O. staff. This covers all grades of staff from the President whose salary is 22,000 Canadian dollars plus 5,000 dollars per annum entertainment allowance, to a salary range for "junior clerks-messengers" varying between 540 and 780 dollars. P.I.C.A.O. has its attractions, it would seem.

SCOTTISH AIR SERVICES

IN replies in the House of Commons on June 5th, the Parliamentary Secretary to the Ministry of Civil Aviation gave the following information regarding plans for air services to points in or around Scotland:

ABERDEEN

A London-Aberdeen service was originally planned to begin in August, but as the necessary buildings at Turnhouse (Edinburgh) cannot be made ready before the autumn, the service has been postponed until that time. Initially, the schedule will operate once daily in each direction, but in due course the Minister intends to provide a very good service to Aberdeen.

OUTER HEBRIDES

The problem of transporting lobsters and fish by air from the Outer Hebrides has been fully studied, but the many difficulties are, for the time being, "intractable."

NORTH UIST

Delay in the resumption of a service to North Uist Island is due to the unserviceability of the grass landing ground at Sollas. In turn, work on this has been delayed because neither the landowners nor Scottish Airways have been willing to carry it out in view of the possible acquisition of the landing ground by the State. Now, because of the time which will be required before the grass can be made good, it is unlikely that the landing ground will be serviceable before autumn.

DOMINIE DEAL

THREE ex-R.A.F. Dominie aircraft have been taken over by Scottish Airways, Ltd., and will be used on the company's feeder services. The aircraft were formerly operated by No. 1680 Communications Flight for the ferrying of VIPs and R.A.F. personnel and to and from stations in the Hebrides, Orkneys and Shetlands. At present the aircraft are being converted for civil airline use but eventually two of the machines will be based at Renfrew and the third at the headquarters of the Company's northern section at Inverness. Incidentally, Capt. A. Appleby, A.F.C., and Capt. A. Martin, who have just joined Scottish Airways as pilots, were formerly members of No. 1680 Flight.

MEAT BY AIR

IN order to provide for the rapid and more efficient transport of meat to markets in Australian capital cities, bulk air freight arrangements from the interior of the continent are being planned. Inland killing centres, each equipped with an airfield, are proposed so that cattle can be slaughtered while in the prime of condition and the meat flown to the markets with the minimum loss of time. At the moment, in some parts of Australia, it is necessary to drive cattle as far as 1,700 miles "on the hoof" to markets.

PORTSMOUTH CHARTER

THE first charter run by Portsmouth Aviation, Ltd., was made last month with a flight from Cairo to Paris. The pilot was Capt. W. H. Andrews. The company is operating at the moment with a D.H. 89a Rapide and a Proctor. Before the war Portsmouth Aviation—then known as Portsmouth, Southsea and Isle of Wight Aviation—ran charter flights and also, of course, the Isle of Wight service. Apart from its reformed charter organization, P.A. are going ahead with the construction of a light twin transport, the Aerocar.

WEATHER

LAST month the first issue of a new meteorological journal, *Weather*, made its appearance. It is published by authority of the Royal Meteorological Society and should be interesting and valuable both to those directly concerned with such matters and to professional pilots.

This first issue contains a number of "informative" articles—including one from the aircrew angle, explaining what is actually wanted from the forecaster; a description of the British type of Radiosonde recorder; and one describing the connection between present-day meteorology and old-fashioned weather lore. This last has been written by Professor Brunt, who is, incidentally, the chairman of the British Gliding Association.

COMBINED UNDERSTANDING

EVIDENTLY the transport flying conditions in France are as thoroughly involved in rules and regulations as they are in this country. An organization has been formed under the title of "Groupement Professionnel de l'Aviation Commerciale Privée" to enable its members—charter and other firms—to study in common the various problems concerned with their professional activities. Recently the French Secretary-General for Commercial Aviation issued a certain number of professional permits for private aircraft operators, who are permitted to run scheduled air services as well as charter services. For the benefit of French readers the address of the "Groupement" is 6, Rue Galilée, Paris, 16.

BLACKPOOL TO RHODESIA

THIS is certainly, in some ways, a perfect period for the charter operator. With the airlines booked up and shipping facilities still so reduced, the traveller must naturally turn to the idea of a privately hired aircraft. Last month one of the Lancashire Aircraft Corporation's D.H. Rapides set off to Southern Rhodesia carrying, amongst others, a passenger on his way out to a civil appointment and to a wife whom he married while being trained there for the R.A.F.

At the moment the L.A.C. have three Rapides and an

"Flight" photograph

FASTER THAN MOST: "Paced" by a Spitfire the Hermes/Hastings prototype showed a top speed of 355 m.p.h. on recent test flights. A cruising speed of 300 m.p.h. is possible. That this excellent performance is not obtained at the expense of cabin volume will be gathered from this new view.

CIVIL AVIATION

Auster, while a Percival Proctor and a Vega Gull are on order. They are now operating from Squire's Gate, Blackpool, with maintenance at Stanley Park. So far they are almost the sole tenants at S.G., where W/Cdr. Tipper, previously senior flying control officer in Bomber Command, is airfield manager.

TRANSATLANTIC RECORDS

THE first of B.O.A.C.'s Constellations, *Balmoral,* carried out a non-stop proving flight from New York to London Airport in the record time of 11hr 24min last week-end. Weather conditions were favourable for this trial flight, and so the aircraft overflew Gander and Rineanna, and covered the 3,520-mile Atlantic crossing at an average height of 21,000ft and an average ground speed of 310 m.p.h. *Balmoral's* captain was Capt. W. S. May, and, in addition to the B.O.A.C. crew, there were also Corporation officials and technical staff on board the aircraft. The other four B.O.A.C. Constellations will be named *Bristol II, Berwick II, Bangor II* and *Baltimore.*

B.S.A.A. NEWS

LAST week, a British South American Airways' York *Star-leader,* on charter to the Shell Petroleum Co., made a direct flight from Gander (Newfoundland) to London Airport, a distance of 2,000 nautical miles, in 10½hr. Capt. D. A. Brice was in command of the aircraft.

On June 28th, with the introduction by B.S.A.A. of a three times weekly service to South America, Avro Yorks will be used for the first time on this service, in addition to Lancastrians. The Yorks will carry twenty-one passengers as compared with fourteen on the Lancastrian. Another new service will be introduced on June 27th, when a weekly through schedule to Santiago (Chile), using Lancastrians, begins.

TUDORS FOR THE ARGENTINE

FOLLOWING the signing of the air agreement between the British and Argentine Governments comes the news that orders have been placed by this country for six Avro transports. Negotiations had been in progress for some time and the orders placed some two months ago, but the official announcement could only be made last week. The Argentine company concerned is the National Airline—Flota Aerea Mercante Argentina—and the aircraft ordered are three Yorks and three Tudors.

The Yorks, which are being laid out as 21-seaters to British South American Airways standards, should be delivered within ten weeks, but the delivery position in the case of the Tudors has not yet been settled. These Tudors will be 40-seaters with day-flying accommodation only.

LONDON'S TERMINAL AIRPORTS

EXCEPT for their North Atlantic service between Prestwick and Canada, all B.O.A.C. landplanes are now operating either from the London Airport or from Northolt. The last B.O.A.C. service to operate from Hurn left there for Egypt last Friday. The terminal arrangements for B.O.A.C. services are, therefore, as follows:—

London Airport:
To Egypt and India (twice a week); to South Africa and Australia (three times a week); to Canada (five of the seven weekly services); to United States (two services a week operated with Constellations, beginning on July 1st).

Northolt:
To Egypt (daily); to Palestine (twice weekly); to Persia (weekly).

In addition, as described in *Flight* on June 6th, all the Continental services of British European Airways Division operate from Northolt.

GOING UP

AS might be expected, the nationalization of civil aviation is resulting in a steady build-up in the number of staff employed in the Ministry of Civil Aviation. The following figures for personnel and pay for the staff at headquarters and outstations which were disclosed recently show the rate at which both have increased during the past six months. The figures do not include messengers or cleaners!

Date	Permanent and Established Staff	Temporary and Unestablished Staff	Cost of Salaries and Wages £
Oct. 1st, 1945	387	434	319,168
Feb. 1st, 1946	470	565	not quoted
Apr. 1st, 1946	506	695	not quoted
May 1st, 1946	553	862	560,220

BREVITIES

In order to provide a further air link between Prestwick and London, arrangements have been made for the Glasgow-London service to call at Prestwick five times a week in each direction. This service is additional to the R.A.F. Transport Command "shuttle" which already operates between Prestwick and Blackbushe.

* * *

An augmented schedule between Renfrew and Belfast will be introduced from next Monday, when an additional service is brought into operation every week-day in both directions, using 21-seater D.C.3s.

INTERNAL ROUTE EXPANSION

THE first stage of the expansion of internal air routes in the U.K. is covered by a schedule of air services which has been announced by the Ministry of Civil Aviation, and which will be operated by the proposed British European Airways Corporation. The programme contemplates not only additional routes radiating from London and other important centres in the U.K., but also "cross-country" routes and "seasonal" routes, the latter being intended essentially to augment the regular services at holiday periods.

In addition to the existing services from London to Belfast direct, to Liverpool and Belfast, to Glasgow, and to the Channel Islands, a service to Belfast via Manchester will begin in July. A London-Prestwick service will start in August; services from London through Bristol, Exeter and Plymouth to the Scilly Isles, and also direct to Cardiff and Swansea in September; and in October, a service through Birmingham, Manchester, Liverpool, Carlisle and Prestwick to Glasgow, another through Bradford/Leeds, Newcastle, Edinburgh and Errol to Inverness, and a third through Edinburgh to Aberdeen. Finally, so far as the schedules from London are concerned, there are also proposals for two more services to Belfast, one through Manchester and Liverpool, and the other through Blackpool.

The first of the "cross-country" routes will come into operation in September and it will run from Liverpool to Grimsby via Manchester, Bradford/Leeds, Doncaster and Hull. Three more are contemplated for October: Newcastle-Prestwick-Glasgow; Newcastle-Bradford/Leeds-Manchester-Bristol; and Liverpool - Birmingham - Bristol - Southampton - Isle of Wight-Brighton. Other cross-country services, the dates for which have not been finally arranged, will be Bradford/Leeds-Hull-Newcastle; Bristol-Birmingham-Norwich; Belfast-Newcastle.

The existing Scottish services will be augmented next month by a service from Glasgow through Aberdeen, Lossiemouth and Inverness to Stornoway, and in October, by an Edinburgh to Glasgow direct service. Later there will be additional services from Glasgow via Errol to Aberdeen, via Oban and Mull to Barra, one to Skye direct, and also an Orkney inter-islands service.

Other internal services to be introduced in July will operate from Swansea/Cardiff to Bristol, and to Weston-super-Mare. There are also to be four additional services introduced next month from the Isle of Man. They will run to Manchester, Blackpool, Carlisle and Newcastle, and Belfast respectively.

Further additional services are scheduled for operation between Portsmouth and the Isle of Wight, Brighton and the Channel Islands, Swansea/Cardiff and Land's End, via Barnstaple and Newquay, and Liverpool and Glasgow via Blackpool and Barrow, but the target dates for these have not yet been fixed. Similarly, the seasonal routes, so far, have no target dates, but altogether six of them are contemplated at present. They will be as follows:—London-Isle of Wight; Bristol-Bournemouth-Isle of Wight-Brighton; Southampton-Isle of Wight; Cardiff-Exeter-Channel Islands; Isle of Man-Glasgow; Birmingham-North and Western Wales.

In all, the proposed schedule covers fifty-two services including the six seasonal routes, but adherence to the target dates will depend not only upon the delivery of aircraft, but also upon the provision of essential ground services and organisation on the routes. The services calling at Prestwick are primarily for the benefit of passengers travelling on the North Atlantic services, and internal services connecting Prestwick with other points in U.K. will be developed to meet the needs of this transatlantic traffic.

THE SKIN OF OUR 'TEETH'

Between the elements and our vehicles and vessels of war came Cellon Protective Finishes. Tropical sun and arctic cold, the corrosion of sea water and the phenomenal wear-and-tear of warfare—Cellon Protective finishes withstood them all. Launches, Torpedo Boats, Minesweepers, 'Dukws,' Trucks, Airborne Lifeboats, Tanks, Invasion Barges—all these were the teeth of our war effort and Cellon Finishes the skin of our teeth! These are the finishes which are gradually again becoming available for commercial purposes. Meanwhile Cellon experience is making the best of ingredients so far released.

CELLON
CERRIC
CERRUX
THE FINISHES THAT STAND THE RACKET

FULL DETAILS OF FINISHES FOR ANY SPECIFIC PURPOSE FROM CELLON LTD., KINGSTON-ON-THAMES. TELEPHONE: KINGSTON 1234 (5 LINES)
Thorp-Hambrock Co., Ltd., Montreal, Canada. Cellon Corporation Pty. Ltd., Sydney, Australia
CVS-547

FLIGHT
June 20
1946.
Advert.

The

AIRSPEED

CONSUL

the junior member of the Airspeed family.

A civil conversion of the world-famous Oxford, the standard twin-engine trainer of the Royal Air Force, the Consul is produced to meet the demand of business houses for aircraft for executive travel, charter services and feeder lines. Equipped with the remarkably reliable Armstrong Siddeley Cheetah 10 engines (1,250 hours between overhauls) the Consul is economical to operate, reliable in service and has excellent flying characteristics.

Two crew.
Five passengers and luggage.
Maximum weak mixture cruising speed 165 m.p.h.
Price, £5500
Complete except radio.

AIRSPEED LIMITED, PORTSMOUTH & CHRISTCHURCH, ENGLAND
Associated Companies in Australia, Canada, India, Africa and New Zealand

AIRSPEED

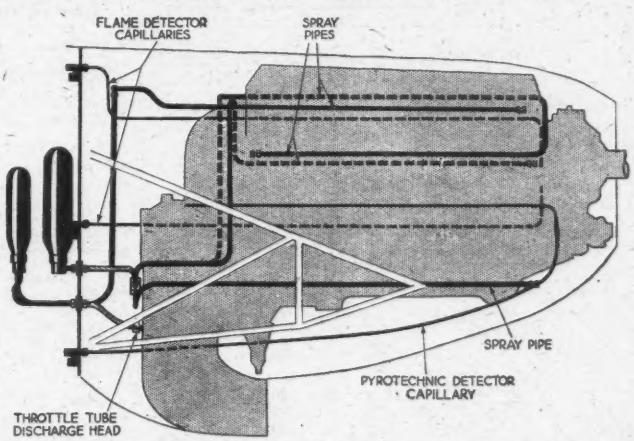
Fire Suppression

Survey of the Graviner Fire-fighting System for Aircraft : Manual and Automatic Actuation : Crash and Flight Fire Requirements

WHEN thinking of modern aircraft and the high level of efficiency to which safety measures have been developed, how frequently does one consider the means of combating fire? In general, not very often. Admittedly fire in the air is fortunately a rare occurrence, but fires consequent upon crashes are by no means so rare.

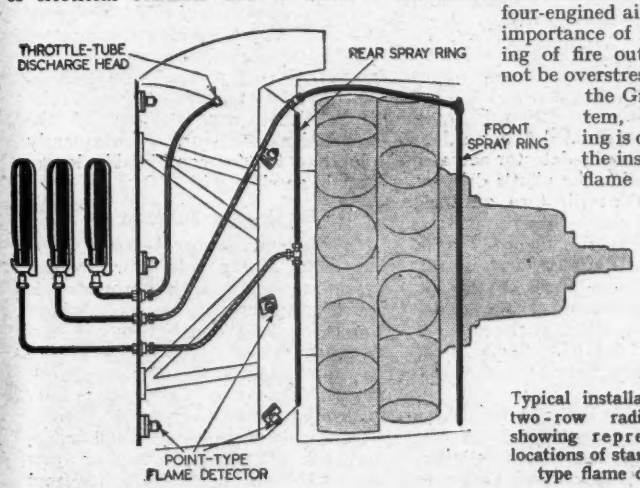
The original fire-fighting equipment developed by the Graviner Manufacturing Co., Ltd., has been extensively used on R.A.F. aircraft since 1939, but the intensive investigations undertaken by the Accidents Department of the Air Ministry, and the fire trials made by the Engine Department of the Royal Aircraft Establishment and the U.S. Civil Aeronautics Administration, have now made it possible to design aircraft fire-fighting systems of the most comprehensive character which will give a very high degree of fire protection, both in flight and in the event of a crash.

Nevertheless, it must be appreciated that, however desirable fire-fighting appliances are, it is absolutely essential that under no circumstances must such equipment operate inadvertently. In this connection, instances of the difficulties attendant upon aircraft fire-fighting installations are given, for example, by (i) the chatter of electrical contacts due to unsuspected vibrational effects, which has to be overcome by the adoption of special contact arrangements; (ii) the seepage of oil, hydraulic fluid and other liquids into electrical terminal blocks, necessitating special moisture-excluding sealing devices; (iii) the effects of extremes of temperatures, which entail special precautions in design; and (iv) exposure to sea water with its corrosive effects, which make necessary special materials and protective treatments of various kinds.



Diagrammatic illustration of in-line engine installation showing arrangement of spray-pipes and layout of new capillary-type flame detectors.

Before going on to consider the actual components which make up the Graviner system it might be advantageous to run through a typical installation suitable for, say, a four-engined aircraft: The importance of early warning of fire outbreak cannot be overstressed and, in the Graviner system, this warning is obtained by the installation of flame detectors in the engine nacelle. These detectors are connected to suitable switches which light-up a warning lamp for each engine on the pilot's or engineer's panel. When a fire occurs, the detectors operate and, on receipt of the warning, the pilot (or engineer) must (a) close the appropriate throttle; (b) feather the airscrew; (c) turn off the particular fuel cock and, if provision is made, the oil cock too, and (d) press the "FIRE" push-button — all these operations to be carried out as nearly simultaneously as possible.



Typical installation for a two-row radial engine showing representative locations of standard point-type flame detectors.

This is the official standardized fire drill, although in the modern installations for large aircraft the extinguishing system is brought into operation by actuation of the airscrew feathering push-button; this is arranged by having extra contacts on the feathering button, and a relay which is brought to the "ready" position by operation of the flame detector. By this means, normal feathering drill is not affected but, if a fire does occur, the feathering switch automatically becomes, in addition, the extinguisher system switch. However, if any fault has developed in the line, or the wiring is in any way affected, the "FIRE" push-button will cause operation of the appropriate extinguishing gear. The advantages of retaining a standardized fire drill are obvious.

Smothering Sequence

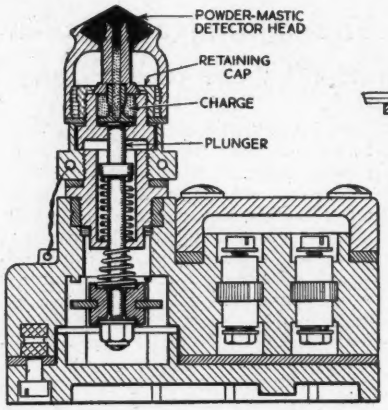
Operation of the extinguishing equipment then takes place as follows: (i) an extinguisher connected into the induction system on the engine side of the throttles starts to discharge, so rendering the inducted mixture non-inflammable. This effectively "kills" the engine; (ii) a delayed-action switch in the circuit of the spray pipe extinguisher for the engine exterior starts to operate simultaneously with (i); and (iii) eleven seconds later, when the feathering operation is complete and the engine is stopped and the intake extinguisher nearly discharged, the delay switch operates the spray pipes extinguisher to smother the engine and accessories with the extinguishing medium and so suppress any fire. It

FIRE SUPPRESSION

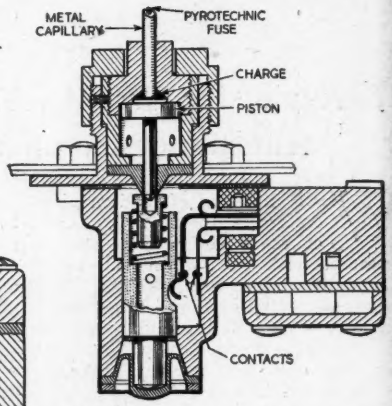
must be appreciated that airscrew feathering to stop the engine rotating is absolutely essential, not only to ensure an optimum extinguishing operation, but also to prevent break-up of the engine where an outbreak of fire has followed mechanical failure.

The foregoing is applicable to a fire outbreak occurring in flight, but in the event of a crash an insurance against fire is required as well as automatic operation rendering unnecessary the actuation by pilot or engineer who, of course, might be incapacitated. To this end, the Graviner inertia, or crash-switch, has been developed. This is a device which, under an acceleration of 6g or more, automatically ensures the performance of the following operations: (a) the discharge of all intake extinguishers; (b) the discharge of all spray pipe extinguishers to smother engines and accessories; (c) the operation of dinghy jettison or other safety devices if required.

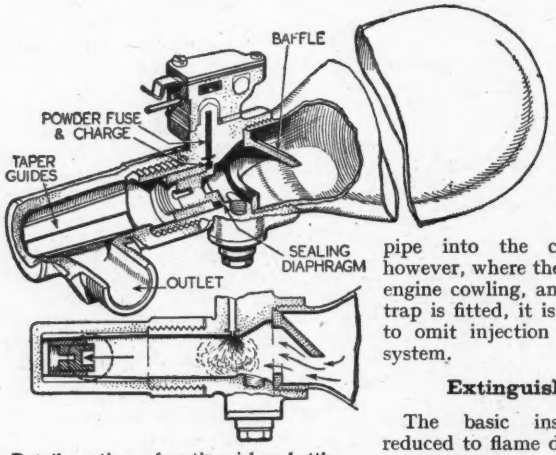
In addition to these, provision is made in the crash equipment for operating the following devices: (i) a dual-head extinguisher, one head of which is connected to the intake,



Point-type flame detector in which firing of the charge opens the retaining cap and allows the plunger to rise, so closing the electrical contacts.



Section through capillary-type flame detector switch in which firing of the powder charge moves the piston and so closes the electrical contacts.



Detail section of extinguisher bottle discharge head showing how powder charge displaces the sealing plug to allow emission of the smothering agent.

whilst the other head feeds special spray pipes discharging over the exhaust system. In flight fires, only the intake head operates, but in a crash both heads give simultaneous discharge into the intake and over the exhausts; (ii) fuel and oil line shut-off cocks at the firewall, and the service cocks on the tanks; and (iii) an accumulator cut-out switch to prevent fires arising from short-circuits after a crash.

Equipment and installations so far described comply with the Air Registration Board's requirements for heavy and medium aircraft, but in a light aircraft such comprehensive equipment is not always justified. In point of fact, for aircraft employing engines up to 200 h.p., automatic equipment is not, generally speaking, thought necessary. For light machines, only one extinguisher bottle per engine is employed, feeding spray pipes covering the engine and accessories with, if desired, a feed from the spray pipe into the carburettor intake; however, where the intake is inside the engine cowling, and an efficient flame trap is fitted, it is usually permissible to omit injection into the induction system.

Extinguishing Agent

The basic installation is thus reduced to flame detectors, one extinguisher bottle per engine, and the fire warning lights. Operation is by a suitable switch provided with a safety cover, and when the detector actuates the warning light, the pilot's drill is: (i) close throttle; (ii) turn off fuel; (iii) wait until engine has stopped, or nearly so, and (iv) operate extinguisher switch. Under crash conditions, the Graviner crash switch will ensure the discharge of the extinguisher for each engine at the moment of impact, and the pilot should, if he has time, already have turned off the fuel supply.

Methyl-bromide is the extinguishing or smothering agent used in the Graviner system, and is the most effective medium for its purpose known to science. It is liquid only when under pressure, boils at 40 deg F, has a vapour density of 3.25:1 in air, and evaporates with intense lowering of temperature when liberated. Thus, in a crash, for example, if methyl-bromide be discharged over the hot parts of an engine, the temperature of such parts would be reduced below the ignition temperature of fuel and oil vapours, so precluding fire. Again, if fire is actually present, methyl-bromide discharged over it induces a powerful inhibiting action, and the fire is put out—this applying no matter whether the fire is still being fed with fuel. In addition, if methyl-bromide vapour is present a fire cannot be regenerated.

Previous to the advent of methyl-bromide, the most widely used smothering agent was CO_2, but methyl-bromide is a considerable advance on the latter in almost every instance. For example, under crash conditions, if CO_2 is used it is discharged as a gas and tends to dissipate quite rapidly since it is only one and a half times the weight of air. Not only is methyl-bromide vapour heavier but, additionally, any of the liquid not in contact with hot surfaces, or falling on the ground, will evaporate comparatively slowly and so tend to keep up a relatively dense concentration of the suppressive vapour, consequently inhibiting fire for considerably longer than is possible with CO_2.

Explosive Discharge

In the extinguisher bottles, which are light, strong cold-drawn copper cylinders, the methyl-bromide is stored under nitrogen pressure of about 100 lb/sq in. The bottles are hermetically sealed after filling, and can be discharged only by electrical means. Operation of the extinguisher is effected by the electrical ignition of a fuse, which detonates a small charge in the head. As may be seen from one of the drawings, the outlet from

THE TUDOR SPIRIT LIVES AGAIN...

THE AVRO TUDOR II.

Latest of a long line of famous aircraft—the Avro Tudor II, Britain's premier airliner, a sixty-passenger aircraft specially designed for trans-continental services.

SUPERPLANES BY AVRO

A. V. ROE & CO. LIMITED, MANCHESTER (BRANCH OF HAWKER SIDDELEY AIRCRAFT CO. LTD.)

The
★*AVRO* TUDOR I & II
fitted with
SMITHS *equipment*

SMITHS Aviation Instruments have been selected by British constructors for their post-war civil aircraft.

★ *There are more than 100 separate items of Smiths Aviation equipment on every Avro Tudor.*

A103

SMITHS AIRCRAFT INSTRUMENTS LTD
The Aviation Division of S. Smith and Sons (England) Limited
CRICKLEWOOD WORKS · LONDON N.W.2

FIRE SUPPRESSION

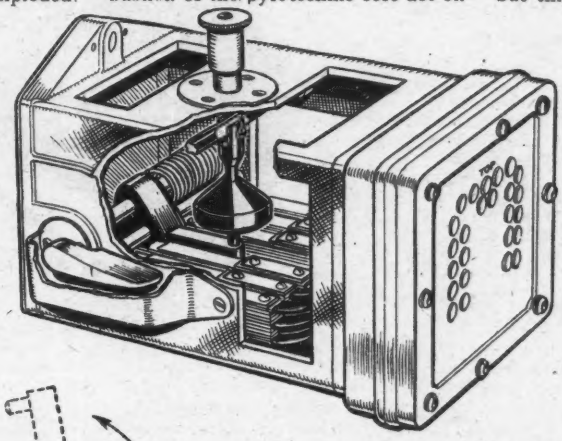
the bottle is closed by a plug divided from the bottle interior by an annular diaphragm, about 0.017in thick. The explosive charge is enclosed behind this diaphragm and, when exploded, shears the diaphragm and at the same time causes the plug to be blown forward into the discharge elbow, where it seizes-up in three taper guides and is so prevented from blocking the outlet passage. The internal pressure in the bottle then forces out the methyl-bromide through the discharge elbow to which the pipes are attached.

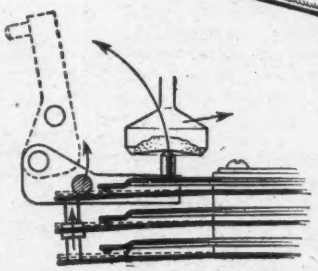
Extinguishers should preferably be mounted vertically, but a deflector baffle in the neck of the bottle is incorporated so that, where essential, the extinguisher cylinder may be inclined to within 23½ deg of the horizontal. Although small-sized one-pound bottles are available for cabin use, etc., the normal Graviner bottles used in installations are 6lb and 12lb content weight having, respectively, a discharge time of 1.8 and 3.6 seconds. As methyl-bromide is quite colourless and leaves no trace after evaporation, a tinge of orange dye is added so that, in the event of the extinguisher discharging, a stain can readily be seen. It may, however, easily be removed with the aid of paraffin. This applies to installed extinguishers but not to small, hand-operated, extinguishers which may be used in a cabin.

Flame Detection

The latest form of flame detector comprises a metallic capillary tube enclosing a pyrotechnic core, one end of the tube being sealed and the other end attached to a switch. On small or medium-sized engines, two of these detectors are recommended, but for large engines four should be fitted. The detector responds extremely rapidly to flame or temperatures in excess of 250 deg C, and conforms with official requirements in that damage to the detectors does not give a false fire alarm. No physical damage to the metal tube will cause the detector to operate, whilst in the event of the tube being severed by, for example, engine break-up, that part still connected to the switch will continue to be effective in flame detection.

The switch itself is normally mounted behind the firewall, and only engine break-up is likely to cause mechanical operation of the switch, in which case it is obvious that operation of the fire equipment would be desirable. The pyrotechnic flame detection tube terminates at the switch end, with its core leading down to a space above a small spring-loaded piston. This engages a plunger which, when displaced, closes the switch contacts. When the flame detector is fired, the gases generated by the combustion of the pyrotechnic core act on the piston and drive it down, displacing the plunger and so closing the switch contacts.





Detail of crash-switch showing how displacement of the pendulum permits the roller to rise and so close the several contacts for the services entailed.

Before the advent of the continuous type of flame detector, the "point" type were used, these being placed at various strategic positions around the engine and having a combustible powder-mastic head as a detection medium. This is fused to an explosive charge surrounding a spigot carrying a tapered flange retained by a screw cap. Against the base of the spigot bears a spring-loaded plunger which maintains the switch contacts in the open position. When the powder-mastic head is fired, it sets off the miniature explosive charge, so opening the retaining cap and allowing the spigot to rise. This, in turn, allows the spring-loaded plunger to rise and so closes the switch contacts.

The delayed-action switch necessary to prevent external smothering of the engine until the airscrew has been feathered and rotation stopped consists, in the latest form, of a pre-set chronometer-type mechanism, which is released by the operation of a solenoid and, after a delay of 11 seconds, closes the pair of contacts which operate the extinguishers connected to the spray-pipe system. The earlier type of switch incorporated a pyrotechnic fuse to occasion the delay, but this had the disadvantage that it could not be re-set, and a new unit was needed.

In essence, the Graviner inertia switch consists of a simple universally-suspended pendulum having a depression in its undersurface, a spring-loaded finger engaging this depression and normally being so held. A roller attached to the finger arm bears on the leaves of the switch contacts so that, when under an acceleration of 6g or more the pendulum is displaced, the finger is allowed to rise with the result that the roller arm is lifted from the contact leaves and the contacts are thus closed.

The crash or inertia switch is so obviously a useful device for ensuring the automatic actuation of particular services in specific instances that all manner of safety precaution refinements would appear to be rendered possible by its use. So far as fires are concerned, it appears to be an obvious step to limit the size of the fire by immediately cutting-off the supply of fuel or oil which is feeding it. The existing fire drill requires the pilot to cut off fuel supplies by the ordinary manual means, and it is obvious that, under many conditions, vital time may be lost in doing this.

All the authorities seem to be agreed that the provision of a single emergency switch which will shut off the engines and the fuel and oil supply, both at the fire wall and at the tanks, is much to be desired. The provision of shut-off cocks at the tanks themselves would appear particularly important since, in a crash, it is not unlikely that inertia might result in tanks being bodily thrown from the aircraft, with the possibility of drenching the machine and surrounding ground with fuel from the fractured pipe lines. Suitable electric fuel cocks and cock actuators for low supply or tank use are under development, and provision is made in Graviner equipment for operating these items both in flight and crash fires without, of course, affecting their normal use.

PRIVATE VIEW AT FARNBOROUGH

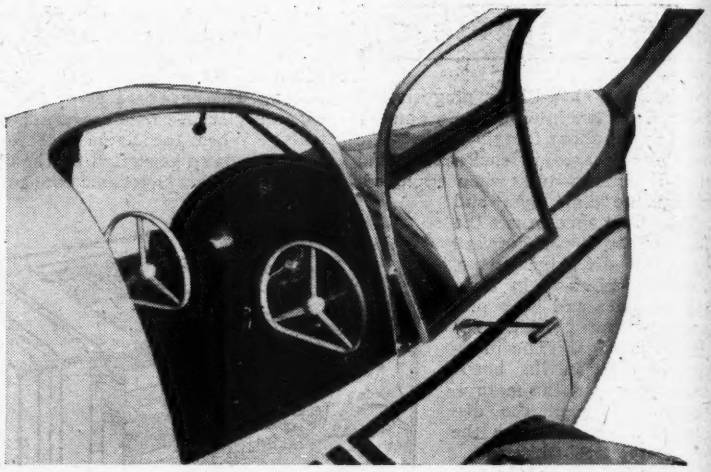
AN exhibition of British aircraft and engines, and a flying display, are to be staged by the Royal Aircraft Establishment at Farnborough on Saturday, June 29th, from 2.30 p.m. to 7 p.m., for the benefit of members of the Royal Aeronautical Society, each of whom may take one guest.

The radio and structures departments, the high-speed wind tunnel and the 11ft 6in tunnel will be open to the visitors, and machines in the flying display will include the Tudor, Hermes, Meteor and Vampire.

Admission will be by ticket only, and these can be obtained by members (5s including tea) from the Secretary, R.Ae.S., 4, Hamilton Place, W.1.

Sokol

High-efficiency Czech Light Aircraft : Some Impressions of the Mraz M.1 Cabin Two-seater

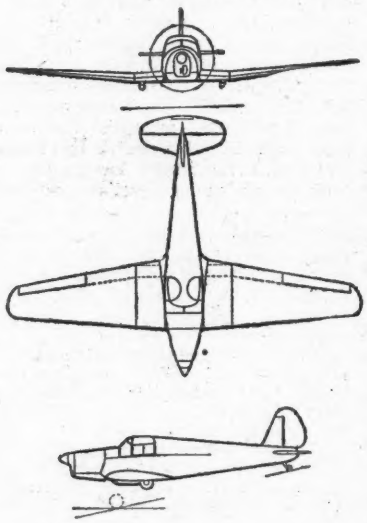


The arrangement of a door on each side, and the use of control wheels rather than columns makes entry easy in the Sokol. The lever in the roof operates the elevator trimming tab, and the brake lever may just be seen in the bottom centre of the dashboard.

BACK in the almost forgotten days of 1939 a surprisingly effective little cabin aircraft, known as the Bibi 550, and produced by the Benes Mraz concern in Czechoslovakia, made its appearance in this country. I spent an educative week-end with this device a month or two before war broke out, and felt that, despite various minor faults, it might have found something of a market over here. The price was low, and it carried two people at quite a high cruising speed in more than ordinary comfort.

Last week its successor, the Mraz M-1 Sokol, or Falcon, was flown over here for a day or two and a re-introduction effected, on my side, with considerable interest. This little two-seater—or, if required, three-seater—is an all-wood, side-by-side low-wing cabin monoplane with a manually retractable undercarriage and a consequently useful performance. The new Walter Minor 4-III has a maximum output of 105 b.h.p. and gives the Sokol a top speed of 150 m.p.h.

From the pilot's and passenger's point of view the Sokol is nearly everything it should be, and if it can be sold in this country for the suggested figure of "less than £1,400" there should be quite a few takers. The cabin is reasonably roomy, all-round view is fair to good, there is ample luggage space on a tray immediately behind the seats, the entry is easy for each occupant, and the handling qualities are "bright" even to the point of encouraging aerobatics for which the aircraft is not really intended.



In a general way, I am against the fitting of wheel controls in any small machine with sensitive ailerons and elevator, since this form of control cannot be so accurately and quickly moved, but the advantages of added leg-room, easier entry and the comfortably car-like appearance will undoubtedly tell from the sales angle. This particular demonstrator had, in fact, a somewhat mechanically stiff elevator action, and this, coupled with the sensitivity in somewhat bumpy conditions, caused some temporary over-corrections until my reflexes had accustomed themselves to the general situation.

Manual Retraction

The Sokol's take-off is shorter than might be expected, and can be hurried, if desirable, by the application of half or full flap at the last moment. Since these split flaps are mechanically operated by a centrally placed handle, the last twenty-five degrees of retraction can afterwards be taken off gently. Undercarriage retraction is completed by means of a large crank between the seats; no particular effort is involved and, in spite of the eighteen turns required, the legs can be locked home within twelve seconds or so. There is no selector—one simply winds, and the legs are automatically locked and unlocked. "Window" indicators in the wing tell one the necessary story. With a small aircraft expert help may not always be available, so a simple mechanical system is very practical. The legs are partially faired and there is no appreciable change of trim when they are moved.

MRAZ M-1 SOKOL
105 h.p. Walter Minor 4-III

Span	32ft 10in.
Length	23ft 4in.
Weight empty	882lb.
All-up weight	1,654lb.
Maximum speed	150 m.p.h.
Cruising speed	134 m.p.h.
Landing speed	40 m.p.h.
Range	620 miles.

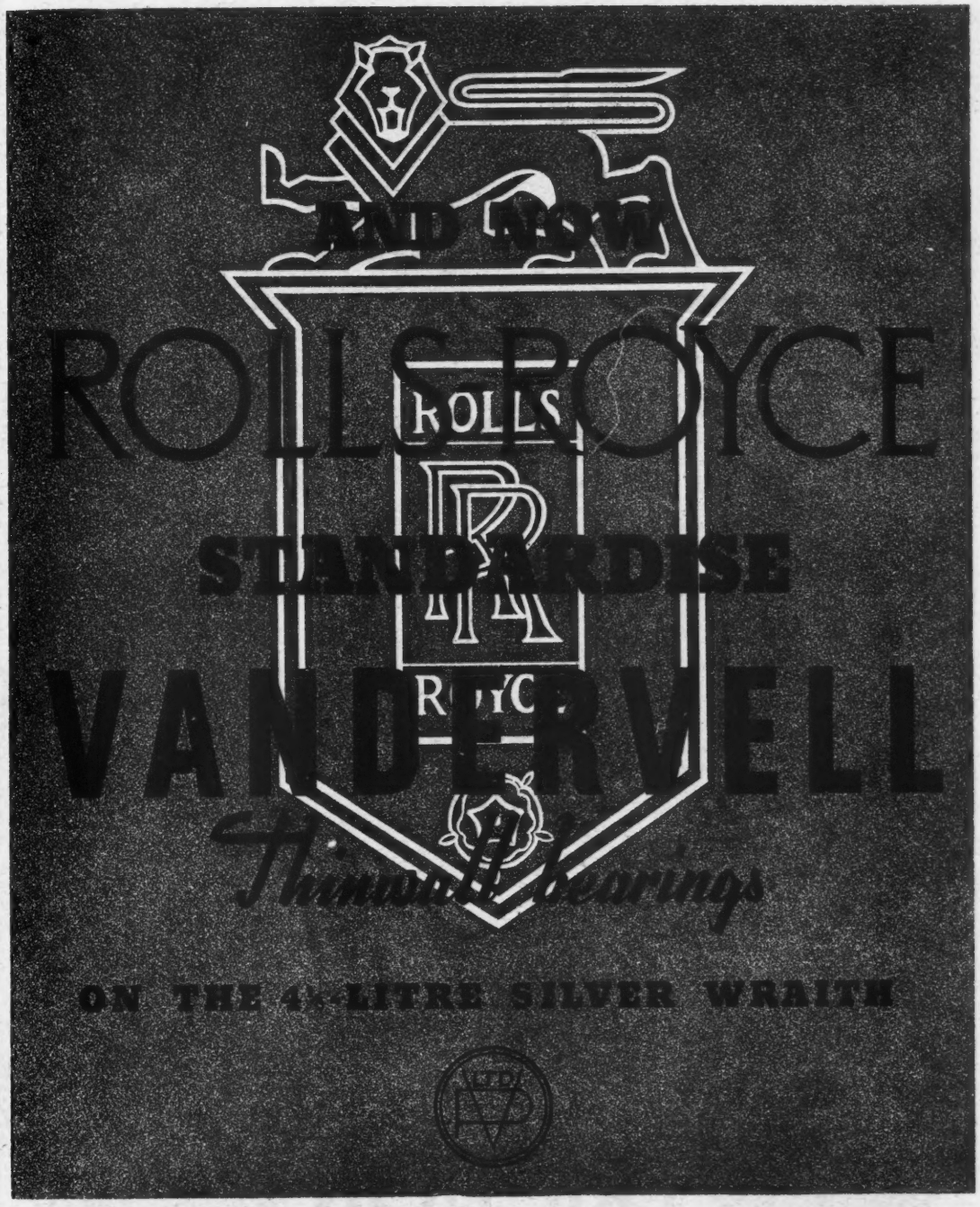
Agents: Aircraft & Allied Enterprises, 10, Hobart Place, Eaton Square, London, S.W.1.

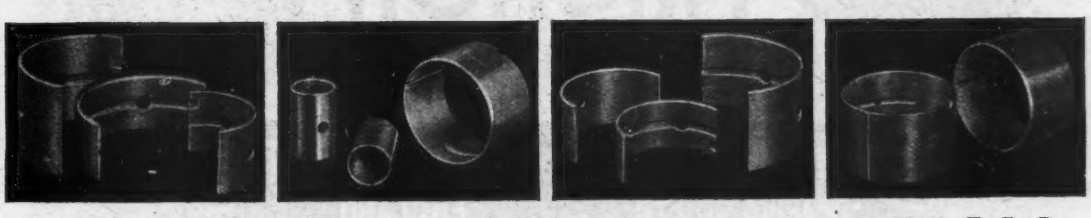
Flat Approach

In spite of the quite reasonable area of the split flaps, the glide is somewhat on the flat side, and the newcomer will be inclined, at first, to find himself too high during the approach, which is made at about 60 m.p.h. This kind of approach has the advantage, however, of reducing to a minimum the landing change of angle, so that, once the approach technique has been mastered, the touch-down involves merely a very slight final movement of the wheel. Given a reasonably slow approach speed the Sokol more or less lands itself, and it is delightfully stable, fore and aft, at 50-60 m.p.h. The stall, flaps up or down, seems to be harmless, though the Sokol will spin and recover in the usual way.

Braking is differential when the central "pull-out" lever is applied, and the taxying view is fair—neither better nor worse than that expected with any tractor-engined cabin aircraft with a conventional undercarriage. For the benefit of long-legged pilots and passengers it might be a good idea if some form of seat adjustment were arranged, though there is, in fact, ample knee-room below the wheel for any normal person.

The word "Sokol" means Falcon, and the aircraft will probably be known in this country and the Dominions by that name. H. A. T.





VANDERVELL PRODUCTS LIMITED
WESTERN AVENUE • PARK ROYAL • LONDON • W·3

Smee's

INITIALS *worth remembering*

VE VICTORY OVER EUROPE

VJ VICTORY OVER JAPAN

BALL & ROLLER R&M BEARINGS

VICTORY OVER FRICTION

RANSOME & MARLES BEARING CO. LTD. NEWARK ON TRENT ENGLAND

CORRESPONDENCE

The Editor does not hold himself responsible for the views expressed by correspondents. The names and addresses of the writers, not necessarily for publication, must in all cases accompany letters.

PICKING THE WAR-WINNERS

Halifax Performance on One Engine

IN reference to Philip Simpson's letter giving his list of allied war-winners in *Flight*, May 23rd, I feel I must take him up on his statement that the Lancaster is the only "multi" able to fly and maintain height on one engine.

This feat was accomplished on a Halifax II (Merlin 20) with full petrol load of 1,882 gallons and full crew, flown by Sqn. Ldr. P. Dobson, at Riccall, Yorks, in 1943—June, if I remember correctly.

Photographic proof is available, and as a point of interest a copy of the original was published in your journal.

Having said my piece, may I thank you for providing an excellent journal; also please will "Indicator" write up the handling of the Halifax. JOSEPH W. HUTTON.

UNUSUAL LANDINGS

Going Backwards in a Spitfire

THE series of articles on "Britain's Test Pilots" is a really nice way to pay tribute to perhaps the most deserving of the flying profession. In this way it is possible to have a miniature study of the history of aviation at least in the last decade or so. The recent article about J. K. Quill is of exceptional interest even to those who have only worked on the beloved "Spit." However, I can think of at least one "professional" aviator who could dispute his claim to the record for going backwards in a Spitfire.

In March, 1942, a medical officer was attempting to land a Spitfire Vb which was in a slight state of disrepair. This Spitfire put down rather fast in a carefully executed landing, but took exception to the bumps of Martlesham and went into reverse, shedding wheels, flaps, rudder, ailerons, etc., at something around 100 m.p.h. The name of the pilot was, I believe, F/O. Noel Jackson, who, it is said, sent the ambulance back with the remark that he always walked back from his own accidents on the basis that any landing you can walk away from is a good one! A. J. MILNER.

ULTRA-LIGHT AIRCRAFT

Victim of Short-sighted Obstruction

YET again do we see the Government stranglehold on a limb of the aircraft industry reducing a potential export trade to yet another example of British slowness on the uptake, and leaving many of our people in a state of frustrated dissatisfaction. I refer to the ultra-light aircraft, for which "at present" the Government has refused to issue flying permits.

As a Government alleged to be dedicated to the cause of the less wealthy in this country, surely they should be glad to see the ownership of an aircraft, at present possible only for the well-to-do, brought within reach of those not so fortunately placed.

The cost of aircraft is proportional to speed, range and carrying capacity. It is therefore obvious that a small, slow aircraft, carrying two persons at the most, powered by a very low horse-power engine and with limited range could be made available at a very low price as compared with the "light" aircraft now selling.

Brought out by firms renowned for the production of reliable and economical aircraft, the ultra-light aircraft would, besides filling a wide gap in the home market, undoubtedly prove of great advantage, both in prestige and purse, if exported in good time and sufficient quantity.

In answer to as yet unexpressed objections, may I say that I see no reason why this aircraft should not prove as safe as any other, if, built by our own incomparable engineers, it was designed to carefully considered specifications and subjected to stringent C. of A. examinations.

But what is the use of hoping? We are tied by our own folly, and it threatens to be years before the industry will be allowed to run itself as only it knows how, before Governments learn that guidance and assistance will bring the country more prosperity than thick-headed and short-sighted obstruction and delay.

Until then it is going to be an uphill fight, but I for one feel that the industry will win through, will find its way somehow through the maze of controls to prosperity, but always must it look back to the period after the war as a time of frustration and lost opportunity. B. E. J. GARMESON.

THE JAMESON AIRCRAFT ENGINE

Crankshaft Arrangement in Flat-fours

YOUR correspondent, "M.I.A.E." (*Flight*, June 6th), infers a little doubt about the progressive variation of mixture charge obtained. It is not easy to assess the matter from a study of the design, but one may at least assume that the effect would be limited to an engine of the type and precise layout shown (or possibly to a radial engine suitably planned), but that the same result would not be achieved with an in-line unit. Charge stratification has been advanced as one of the main reasons for the extraordinary results obtained with the Aspin rotary combustion chamber, the chamber itself acting as a centrifuge; this appears to be a system far more flexible in its application to any type of engine.

However, I am mainly moved to write not on this point but on the statement in the original description that "physical design . . . conforms to accepted flat-four practice." Except for low-speed stationary or industrial engines, I should imagine that a two-throw 180 degree crankshaft cannot be regarded as accepted practice, owing to the severity of the couple which cannot be wholly corrected by crankshaft balance weights.

The Jowett flat-four car engine, which is the only successful British example of the type in this field, has a three-throw crankshaft; the makers have been producing flat twins for 40 years (180 degree two-throw), but the wider spacing of the big ends in the four precluded the use of that type of shaft. Aspin's first light aircraft engine was a flat four with two-throw 180 degree crank, and it was very soon changed to three-throw to get rid of the couple. In Germany the original Volkswagen design had a two-throw crankshaft in its flat-four engine, but this was discarded in the development stage and a three-throw crank substituted. Therefore, it would seem that if a mechanically unobjectionable flat-four engine is required, "accepted practice" is the use of a three-throw crankshaft.

DONALD H. SMITH, M.I.A.E.

SPEED AND THRUST

Calculating Jet Power Output

MAY an interested amateur exhibit his ignorance by asking for an explanation of something doubtless so simple as to make him look ridiculous?

The trouble started seriously when I read "Indicator's" article "Speed and Thrust" in *Flight*, January 17th, 1946, and has gone on ever since. Why can nobody explain satisfactorily why jet engine capability is measured in lb thrust and piston engine capability in horse power?

Agreed that with a constant thrust resulting from the engine power is directly proportional to the speed in the direction of application of the thrust, for power = thrust times speed. But now consider a piston engine being run up. If it is developing 2,000 h.p., then there must be both a thrust and a speed. The thrust you can feel by standing behind the aircraft, but where is the speed? Is it the speed of the backward-moving slipstream, or is it the angular velocity of the airscrew blades? If the latter, then the thrust on which you would have to calculate is the torque resistance due to drag on the airscrew blades. But whichever of the two it is, don't they both apply equally to the jet engine? For you still have your backward-moving mass of air (and then some) and your rotational velocity.

Ah, you say, but you don't worry about the torque resistance to the motion of the jet engine rotor for it doesn't apply. Well, doesn't it? There must be a resistance, or there would be nothing to stop the rotor from flying off to top revs all the time, even at ¼ throttle, except bearing friction and moment of inertia, and you would be getting something for nothing.

My case, then, is that the two engines are equivalent to one another. For take an aircraft flying at 300 m.p.h. i.a.s., and whichever engine you have in it, provided the aircraft is flying s. and l., and not accelerating, the backward thrust of the airstream from the engine is surely equal and opposite to the total drag of the aircraft—or isn't it? Apply the same reasoning at any speed, *including* standing still, and don't you arrive at the conclusion that at zero speed you have zero thrust, which is nonsense? And there are other anomalies.

Obviously, I am talking through the back of my neck, but where have I gone astray? BROWN JOB.

SERVICE AVIATION

Royal Air Force and Naval Air Arm News and Announcements

Portsmouth Fly-past

FIVE Naval squadrons and one R.A.F. squadron took part in the King's Birthday parade at Southsea Common, Portsmouth, on June 13th. Of the squadrons taking part, No. 811 (Mosquito), 813 (Firebrand), and 816 (Firefly) from the Royal Navy and No. 248 (Mosquito) from the R.A.F. also took part in the Victory Day fly-past. The additional squadrons were No. 805 (Seafire XV), C.O. Lt. Cdr. P. G. Hulton, D.S.C., and No. 807 (Seafire XVII), Lt. Cdr. S. J. Hall, D.S.C.

The squadrons formed up over their bases and, led by No. 816 Fireflies from Lee-on-Solent, took up squadrons in line astern formation over Chichester. From the same station followed 805 and 807 squadrons, then 811 and 813 from Ford, and finally 248 from Thorney Island. They flew round the Isle of Wight at 200 kt. at about 2,000 feet, making turns to starboard, and were led north from the island, round Southampton until, losing height to 300ft., they flew past the saluting base on Southsea Common at 1208 hrs. The Royal Navy, Army, Royal Air Force and Royal Australian Navy took part in the parade, and the salute was taken by Admiral Sir Geoffrey Layton. A Royal Salute was fired.

As the aircraft returned to base, thanks and congratulations on their flying were received from the controlling ground radio station.

Unlike most R.A.F. Mosquito squadrons, No. 811 Naval Squadron (C.O. Lt. Cdr. S. M. P. Walsh, D.S.O., D.S.C.) flies its Mosquito VIs off in formation (three vics of three) and lands on in rapid succession, landing times averaging 1 min 30 sec for nine aircraft.

King's Birthday at Singapore

R.A.F. Regiment and two squadrons of aircraft were among those taking part in the King's Birthday parade at Singapore on June 13th. No. 1326 Wing of the R.A.F. Regiment, which fought through the second Burma campaign, paraded with its band. No. 28 Spitfire Squadron, the only Tactical Reconnaissance Squadron to operate throughout the Burma campaign, led the fly-past under the command of Flt. Lt. P. Wickham, D.S.O., D.F.C. No. 84 Mosquito Squadron, which will be remembered for its part in the fighting in Sumatra in 1942, also took part in the fly-past.

The Salute was taken by Air Marshal Sir George Pirie, K.B.E., C.B., M.C., D.F.C., the Air C.-in-C.

FOR VICTORY CELEBRATIONS: H.M.S. Triumph, one of our newest aircraft carriers, entering Southampton Docks to be on show. On the centre line of the flight deck from stem to stern are a de Havilland Vampire and Hornet, a Fairey Firefly, a Supermarine Seafire and a Fairey Barracuda.

Australian Rocket-Range

A FORMAL agreement has been reached between Britain and Australia regarding the establishment of a permanent rocket-testing station in Australia.

Although location of the site has not yet been decided, preliminary investigations have confirmed that conditions for such a range exist. Lt. Gen. Evetts, head of the mission which is in Australia to demonstrate recent rocket developments and to arrange a testing site, stated that he was satisfied that the Mount Eba region, in north-western South Australia, was most suitable for long-range tests.

No. 26 Squadron in Berlin

NO 26 Squadron is the latest Tempest squadron to take up duty at R.A.F. Station, Gatow, Berlin. They have taken over from No. 3 Fighter Squadron which left for England to take part in the Victory Day fly-past.

Commanded by Sqn. Ldr. H. Ambrose, D.F.C. and Bar, No. 26 Squadron has only recently been re-formed and re-equipped with Tempest aircraft.

The squadron was originally formed during the Great War, 1914-18, and served in the South West African campaign. Its Afrikaan's motto "'N Wagter In Die Lug" (The Watcher in the Sky) originated from this area of operations.

At the outbreak of the last war, No. 26 Squadron was equipped with Lysanders and accompanied the B.E.F. to France, and then, from a base in Kent, assisted in the Dunkirk evacuation.

Towards the end of 1940 the Squadron moved to Gatwick, Surrey, and made its home there for two years, where it was re-equipped with Tomahawks and began low level strafing attacks and photographic sorties over Northern France.

No. 26 Squadron was the first to be equipped with Mustangs in 1942.

After doing a number of shipping "recce's" off the Dutch coast and some night intruder operations over France and Belgium the squadron was re-equipped with Spitfires and started training for its special task of spotting for naval guns during the invasion.

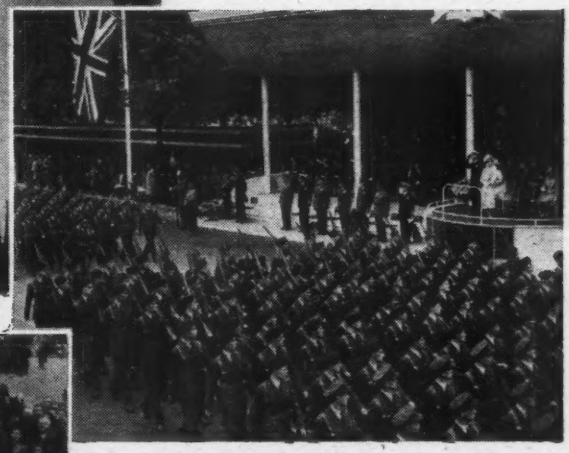
During Christmas, 1944, No. 26 was

(*Continued on page* 636)

OPERATION FLY-PAST

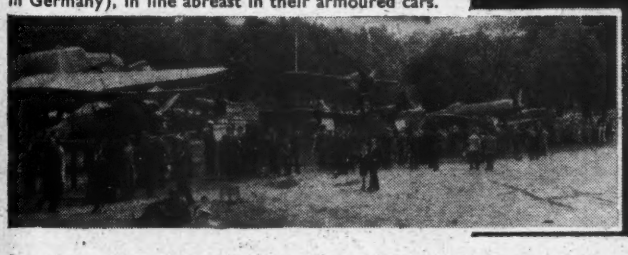
More Photographs of R.A.F.'s Share in the Victory Celebrations : Exhibition in Green Park

Meteors pass over beflagged London in what can only be called Sperry horizon weather. Clouds were down below 1,000ft. and visibility very restricted.



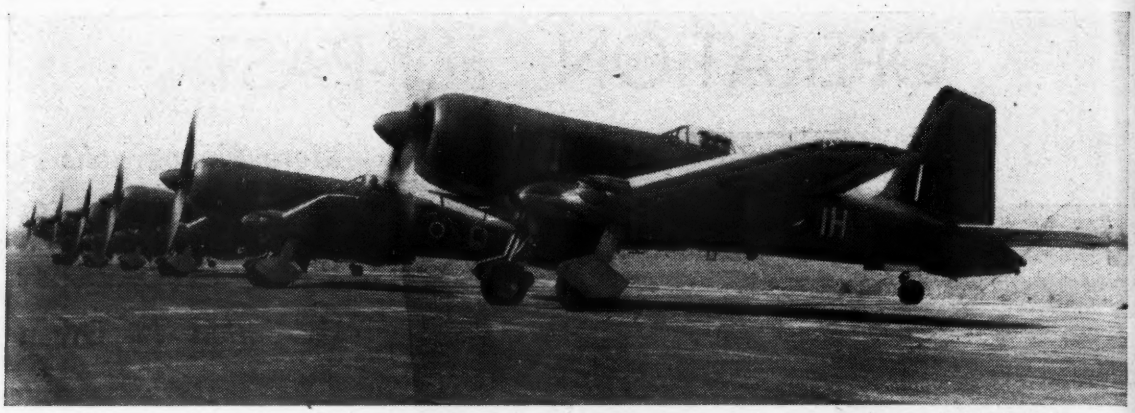
The ground contingents of the R.A.F. and R.A.F. Regiment marching past the King and Queen on the saluting dais in the Mall.

Marshals of the Royal Air Force, Lord Tedder (Chief of Air Staff) and Sir Sholto Douglas (C.-in-C. British Forces in Germany), in line abreast in their armoured cars.



A line of aircraft in the exhibition staged by the Royal Air Force and Royal Navy in Green Park. It was open to the public from June 8th to 16th, and a very representative selection of aircraft was on show. While all types came in for enthusiastic comment—especially by the youthful male element—particular interest was shown in the jet-propelled fighters of which there were a Gloster Meteor and a de Havilland Sea Vampire.

An air photograph taken from one of the flypast aircraft of marching columns and enthusiastic crowds round the Queen Victoria Memorial outside Buckingham Palace. Although rain was teeming down at the time, very few people in the crowds left to seek shelter.



"Flight" photograph.

TORPEDO FIGHTER-BOMBERS: A line of Blackburn Firebrands of No. 813 Squadron N.A.A. running-up their Centaurus engines. No. 813 took part in both the Victory fly-past and in the parade at Southsea in honour of the King's birthday.

SERVICE AVIATION

given the task of discovering and photographing V.2 sites in Holland, and in 1945 the squadron moved to France to assist in the clearance of the German pockets of resistance around the estuary of the Gironde.

Roll of Honour

Casualty Communiqué No. 588.

THE Air Ministry regrets to announce the following casualties on various dates. The next of kin have been informed. Casualties "in action" are due to flying operations against the enemy; "on active service" includes ground casualties due to enemy action, non-operational flying casualties, fatal accidents and natural deaths.

Of the names in this list 300 are second entries giving later information of casualties published in earlier lists.

Royal Air Force

PREVIOUSLY REPORTED MISSING, BELIEVED KILLED IN ACTION, NOW PRESUMED KILLED IN ACTION.—Flt. Sgt. J. Allan; Sgt. A. W. Beauchamp; Sgt. D. F. Brown; Act. Sqn. Ldr. R. K. H. Johnson, D.F.C.; Flt. Sgt. R. B. Judge; P/O. H. Roe; Sgt. R. D. Snape.

PREVIOUSLY REPORTED MISSING, NOW PRESUMED KILLED IN ACTION.—Flt. Lt. G. P. Alexandra; Flt. Sgt. A. H. Andrews; Sgt. L. Annis; Flt. Lt. A. E. Arnold; P/O. W. K. Ashley; F/O. J. H. Asplin; Flt. Sgt. J. J. Atkinson; Flt. Lt. A. J. Bacon; Flt. Lt. R. Baker; P/O. J. Barclay; Act. Sqn. Ldr. P. A. Bates, D.F.C.; F/O. H. O. Berger, D.F.M.; Sgt. D. G. Betts; Act. Flt. Lt. R. G. Beutteli; Sgt. M. G. Bliss; W/O. E. Boydell; Flt. Sgt. W. Brand; Flt. Lt. W. B. Brooks; Flt. Lt. P. Brown; F/O. T. D. Brown; Flt. Sgt. W. H. Bryan; Flt. Lt. E. B. Bunn; Sgt. D. P. Burns; F/O. W. G. Cadman, D.F.M.; Flt. Sgt. A. H. Calvert; Sgt. S. L. Cameron; Sgt. G. W. Carter; F/O. F. D. Chalkley; Sgt. T. H. Chandler; Sgt. H. W. Charlesworth; F/O. M. G. R. Chippendale; Sgt. A. C. Clark; Sgt. R. G. Coles; Sgt. S. Cook; Flt. Sgt. A. J. McF. Cooper; Sgt. R. W. R. Cooper; Sgt. J. Cowie; Flt. Sgt. A. V. Crory; Flt. Lt. H. J. Cross; Flt. Sgt. A. S. Crystal; Flt. Sgt. C. L. Cullen; Flt. Sgt. W. E. Dalby; Sgt. D. C. Davies; W/O. M. Day; Sgt. W. Dolan; Act. Flt. Lt. J. G. Douglas; Flt. Sgt. J. Draper; F/O. G. Ebblewhite; Sgt. R. R. Etherton; Sgt. J. J. Farquhar; Sgt. J. Faulkner; Flt. Sgt. H. Ferguson; F/O. E. J. Fletcher; F/O. R. C. Flutter; W/O. P. Ford; Sgt. A. G. Fry; F/O. G. C. Galloway; W/O. A. F. Goodall; Sgt. N. C. Gordon; W/O. E. J. Goudie; Flt. Sgt. A. R. Gray; P/O. P. J. Gray; Flt. Sgt. A. G. Greive; Sgt. J. Grindlay; Sgt. J. H. Guy; Flt. Sgt. R. Hadlow; Flt. Sgt. J. Hall; W/O. M. Harding; Act. Flt. Lt. W. D. Harrow; Act F/O P. H. Hatcher; Act. F/O. W. J. Havell; Flt. Sgt. J. J. O'B. Heady; W/O. A. W. Hearndon; W/O. J. A. Hebdige; Flt. Lt. R. W. Henderson, D.F.C.; F/O. A. W. Higginson; Sgt. G. W. Higginson; F/O. J. Hindle; F/O. D. J. Hinton; P/O. A. C. Hogg; P/O. R. C. Hollings; Sgt. J. W. Holmes; Sgt. T. W. G. Homer; F/O. R. A. Horne; F/O. R. Howarth; W/O R. S. Howe; W/O. O. P. Hull; W/O. S. Humblestone; P/O. W. J. Hunter; Flt. Lt. P. J. Huntley; Act. Flt. Lt. H. G. Hurrell; Flt. Sgt. L. R. Ironmonger; Flt. Sgt. C. Jackson; Flt. Sgt. I. T. R. James; Flt. Sgt. P. R. Jenkinson, D.F.M.; Flt. Sgt. D. L. Johns; Flt. Lt. A. E. Jones, D.F.C.; Flt. Lt. E. L. Jones; Flt. Sgt. R. Kiddle; Flt. Sgt. A. E. S. Kiff; W/O. D. Kirtley; Sgt. P. A. Lane; Sgt. F. S. Langton; Flt. Sgt. R. A. Loader; Sgt. B. C. Long; Sgt. E. Luke; Flt. Sgt. D. A. McCauley; P/O. A. A. McDonald; Flt. Lt. R. H. McGregor; Flt. Sgt. N. S. McNeilly; Sgt. A. McSkimming; Sgt. P. H. Malkin; Flt. Sgt. H. Mann; W/O. G. W. Mansfield; Sgt. A. T. A. Marden; Sgt. A. Marlow; Sgt. C. A. Matthews; Flt. Sgt. N. G. Mayo; Flt. Lt. J. H. Moreton; Flt. Sgt. A. A. Muddiman; Sgt. A. R. Newby; Sgt. R. F. Niles; F/O. B. J. O'Regan; Flt. Lt. A. V. Pearson; F/O. N. P. W. Pedersen; F/O. G. Phillips; Flt. Lt. E. A. Pollock; F/O. R. W. Ponting; Sgt. W. G. Potter; F/O. E. C. Redfern, D.F.C.; F/O. P. Richardson; Flt. Sgt. F. H. Riches; Sgt. J. R. Ridsdale; W/O. R. Roberts; F/O. E. J. Robinson; Flt. Sgt. J. G. Roddis; Flt. Sgt. B. T. Rogers; Flt. Sgt. Roy; W/O. P. S. Rundle; Flt. Sgt. G. A. Sarson; Flt. Sgt. D. J. H. Sayers; Sgt. A. S. Scott; Sgt. A. Simpson; Sgt. J. G. Smith; Sgt. M. A. Solemon; Sgt. W. H. Stephenson; Flt. Sgt. W. D. Stone; Act. Sqn. Ldr. I. D. S. Strachan; Flt. Lt. G. B. Strang; Flt. Sgt. K. M. F. Swadling; Sgt. T. E. Teanby; Flt Sgt. R. W. Thomas; Sgt. R. V. Trafford; Sgt. K. Trevitt; P/O. W. J. Turner; Flt. Sgt. F. J. Walker; F/O. R. T. Ware; Flt. Sgt. W. B. Warr; F/O. D. F. Warren; F/O. A. J. Watson; Flt Sgt C. J. T. Watt; W/O. E. H. Wheatley; Sgt. H. Whiteley; Sgt. H. E. Whyles; Sgt. W. H. Wicks; Flt. Sgt. J. J. Williams; Flt. Sgt. J W. Williams; Sgt. J. Wilson; F/O. W. H. Wilson; Sgt. D. Winch; Flt. Sgt. J. Woodhouse; Sgt. L. Young.

PREVIOUSLY REPORTED MISSING, NOW REPORTED KILLED IN ACTION.—F/O. E. T. G. Harris; Sgt. R. G. Hibbins; P/O. P. Hunt.

DIED OF WOUNDS OR INJURIES RECEIVED IN ACTION.—W/O P. R. Watts.

KILLED ON ACTIVE SERVICE.—F/O. S. Brown; Flt. Sgt. R. K. Lewis; A/C.2 A. March; F/O. W. Marquiss; Sgt. N. Martin; Flt. Sgt. A. Miller; Flt. Lt. E. A. Robinson; Sgt. A. Ross; Cpl. F. Smith; Cpl. D. H. Sumner; L./AC. E. C. Wedge.

PREVIOUSLY REPORTED MISSING, BELIEVED KILLED ON ACTIVE SERVICE, NOW PRESUMED KILLED ON ACTIVE SERVICE.—Sgt. F. Gill; Flt. Sgt. N. C. Martin.

PREVIOUSLY REPORTED MISSING, NOW PRESUMED KILLED ON ACTIVE SERVICE.—Sgt. A. Allcock; Sgt. J. W. Allison; Sgt. K. Ashworth; Sgt. R. W. Brook; Sgt. D. R. G. Causer; Sgt. R. W. Cullen; Sgt. J. Galloway; Sgt. F. J. H. Harris; W/O. J. C. Jones; Sgt. A. Kemp; Flt. Sgt. A. M. Lewington; Sgt. J. P. McTague; Sgt. C. F. Mangan; Flt. Lt. K. A. W. Morris; Flt. Sgt. J. S. Noble; Sgt. N. J. Osborne; Sgt. N. J. Peace; Sgt. J. W. Slaughter; Sgt. J. Stevenson; W/O. G. D. Taylor, D.F.M.; Sgt. A. F. Whyte.

PREVIOUSLY REPORTED MISSING, NOW REPORTED KILLED ON ACTIVE SERVICE.—P/O. D. B. Arnott; F/O. R. T. G. Arthur; Act. Sqn. Ldr. L. N. Landels; Sgt. P. D. Lowe.

DIED ON ACTIVE SERVICE.—A/C.2 T. H. Austin; L.A/C. D. Ball; A/C.2 E. Beever; Sgt. G. G. Bell; L.A/C. J. Coventry; L.A/C. C. C. Ellis; L.A/C. E. Fisher; A/C.1 M. M. Flinn; Sgt. J. R. W. Forshaw; A/C.2 H. Forster; L.A/C. J. Galvin; A/C.1 H. C. Gardener; L.A/C. E. G. Gibson; A/C.2 J. A. Gilbert; Cpl. L. M. B. Goddard; L.A/C. E. I. Goodrich; A/C.1 C. W. Goodrum; L.A/C. F. Gordon; L.A/C. W. McQ. Greig; A/C.2 O. H. Griffith; L.A/C. K. W. Hermon; A/C.2 T. Hodges; A/C.2 F. Hodgkinson; L.A/C. B. Humphries; A/C.1 B. Jones; A/C.1 A. Lane; Sgt. J. R. McBride; L.A/C. A. E. Martin; Sgt. D. J. Perry; Cpl. J. W. Phillips; L.A/C. J. O. Ramsey; A/C.1 F. Robinson; Cpl. H. W. Sargeant; A/C.1 W. Simpson; A/C.1 F. J. Slinger; W/O. L. E. Small; A/C.1 B. Smith; L.A/C. S. T. Swift; A/C.2 H. D. Trapp; A/C.2 E. H. Watts; A/C.1 W. A. C. Watts; L.A/C. R Webster; Cpl. G. M. Wilde.

Badge of No. 139 Bomber Squadron R.A.F.—"Si Placet Necamus" (We destroy at will).

Royal Australian Air Force

PREVIOUSLY REPORTED MISSING, NOW PRESUMED KILLED IN ACTION.—Sgt. G. Beckoff; W/O. A. B. Brennan; W/O. P. H. Brewin; Flt. Sgt. R. C. Broad; W/O. P. W. Byers; P/O. D. K. Caldwell; P/O. T. H. Cambridge; Act. F/O. D. C. Church; P/O. J. C. Cottier; W/O. P. R. Criddle; Flt. Sgt. W. A. Dickson; Flt. Sgt. R. K. Emrose; P/O. J. M. Felgate; P/O. R. E. R. Fountain; Act. Flt. Lt. H. M. Godsall; Flt. Sgt. A. W. Haselhurst; Flt. Sgt. F. J. Hurstwaite; F/O. D. J. Jennings; Flt. Sgt. J. A. Joyce; F/O. L. R. McMonagle; Act. F/O. J. H. Middleton; F/O. J. W. Murray; Flt. Sgt. L. W. Poulson; Flt. Sgt. W. A. Schultz; Flt. Sgt. W. A. Stephens; Act. F/O. D. G. Tointon; Flt. Sgt. G. L. Toose; P/O. S. J. Trimble; F/O. G. W. Tuck; F/O. H. H. Turnbull; F/O. E. B. Willis.

PREVIOUSLY REPORTED MISSING, NOW REPORTED KILLED IN ACTION.—Sgt. N. S. Gill; Sgt. J. H. Henderson; Sgt. N. Proven.

Royal Canadian Air Force

PREVIOUSLY REPORTED MISSING, NOW PRESUMED KILLED IN ACTION.—F/O. A. V. Cash; F/O. S. Cohen; Flt. Lt. J. G. Doyle; F/O. T. L. Foley; F/O. M. F. Griffin; Flt. Lt. F. T. Quigley; P/O. N. R. Lamphear; P/O. F. S. Leech; F/O. H. C. Lynch; W/O. C. B. MacDonald; W/O. K. L. D. McCoy; P/O. J. C. McFee; P/O. M. S. McMaster; Flt. Lt. J. G. Maguire; Flt. Lt. C. R. Mills; F/O. H. E. Novak; F/O. S. A. Reid; P/O. J. M. Richardson; Flt. Sgt. R. C. Roller; P/O. R. T. Sowter; F/O. A. J. Stringer; F/O. J. P. H. Terreau; F/O. W. E. Weber.

MISSING, BELIEVED KILLED ON ACTIVE SERVICE—Flt. Sgt. V. A. Spearn.

DIED ON ACTIVE SERVICE.—Sgt. E. W. Goodchild.

Royal New Zealand Air Force

PREVIOUSLY REPORTED MISSING, NOW PRESUMED KILLED IN ACTION.—F/O. R. G. D. Adlam; P/O. F. M. Ashworth; Act. Wing Cdr. R. W. Baker, D.F.C.; P/O. H. E. Billens; Flt. Sgt. P. N. Black; F/O. G. W. Brewer, D.F.C.; P/O. J. L. Childs, D.F.C.; Act. F/O. R. J. Clark; Act. F/O. D. Connop; Flt. Sgt. R. F. Edmonds; F/O. R. N. Ferguson; Flt. Lt. A. J. Fowler; W/O. C. J. Gallagher; P/O. J. B. Gudgeon; Flt. Lt. K. J. Mackenzie; Act. Flt. Lt. K. Mangos; Flt. Sgt. J. M. M. McGinn; Flt. Sgt. A. L. A. Oakey; F/O. P. J. Pentelow; W/O. R. W. Secord; W/O. H. Smolenski; F/O. C. P. Sparkes; Flt. Sgt. M. Swap; P/O. E. C. Temperton; F/O. E. K. Whitechurch.

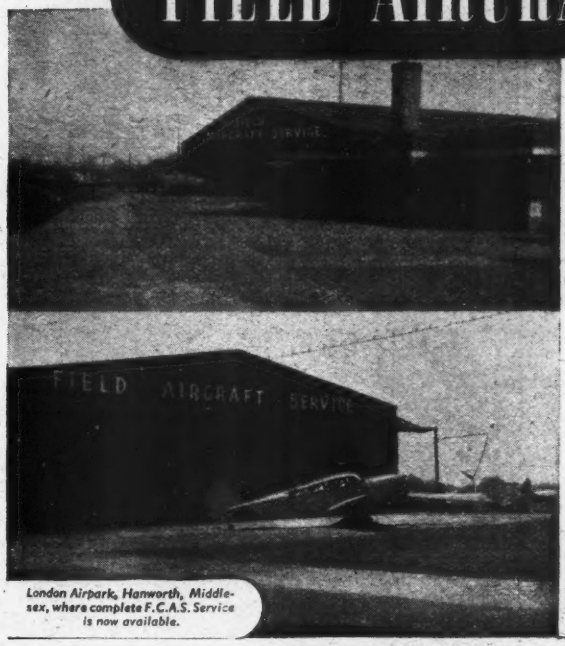
PREVIOUSLY REPORTED MISSING, NOW REPORTED KILLED IN ACTION.—Sgt. A. N. H. Fleming; Sgt. D. B. S. Lee; Sgt. W. A. Moodie.

PREVIOUSLY REPORTED MISSING, BELIEVED KILLED ON ACTIVE SERVICE, NOW PRESUMED KILLED ON ACTIVE SERVICE.—Flt. Sgt. M. G. Cleave.

South African Air Force

PREVIOUSLY REPORTED MISSING, NOW PRESUMED KILLED IN ACTION.—Flt. Lt. D. O. Davies; Act. Sgt. E. Havinga; Capt. A. Lens; Sgt. R. G. Luke; W/O. N. F. Odendaal.

FIELD AIRCRAFT SERVICE



London Airpark, Hanworth, Middlesex, where complete F.C.A.S. Service is now available.

CROYDON • HANWORTH • LUTON • NOTTINGHAM

New and Used Aircraft.

C. of A. Overhauls, Repairs, Modifications and Conversions.

Maintenance and Service Contracts.

Engine Repair and Replacement Service.

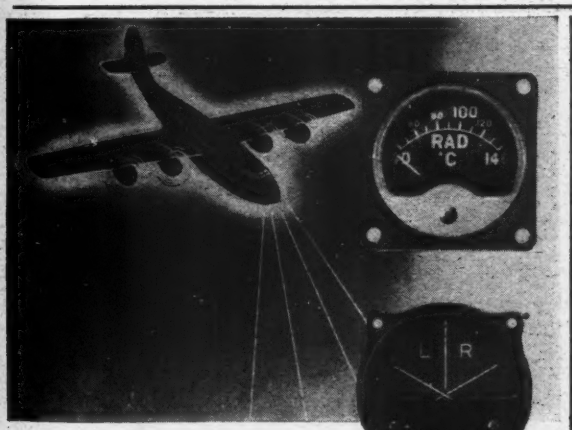
Tool and Component Manufacture.

FIELD CONSOLIDATED AIRCRAFT SERVICES LIMITED

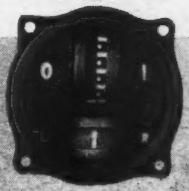
(A.R.B. Approval A.1. 1074/38)

Head Office: Great Woodcote House, Woodcote Drive, Purley, Surrey. Tel: Wallington 7001. Telegrams and Cables: Fieldair, Purley.

W 129.10



The great skyways of peace still call for precision and accuracy in all indicating instruments . . . . a need met to the fullest degree by WESTON AIRCRAFT INSTRUMENTS.



Weston
AIRCRAFT INSTRUMENTS
Positive knowledge from take-off to touch-down

SANGAMO-WESTON LTD.
ENFIELD, MIDDLESEX
Phone: ENFIELD 3434-1242

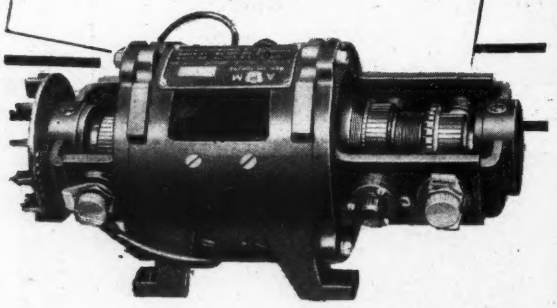
Offkwik
PAINT REMOVER

VULCAN PRODUCTS LTD
SLOUGH and 24 Ryder St. St. James. S.W.1 Abbey 4161 (5 lines)

NEWTON-DERBY

ROTARY TRANSFORMERS

Are highly efficient machines and of minimum weight consistent with reliable performance. We invite you to consult us with your power problems for radio receiving or transmission, public address systems, television, radar, and other electronic equipment.



A typical N.B.D. Rotary Transformer.

NEWTON BROTHERS (DERBY) LTD

ELECTRICAL PLANT SPECIALISTS

HEAD OFFICE & WORKS-ALFRETON Rd DERBY
TELEPHONE DERBY 4286/7
TELEGRAMS DYNAMO DERBY
LONDON OFFICE-IMPERIAL BUILDINGS, 56 KINGSWAY, W.C.2

Sugar Loaf Mountain *Rio de Janiero*

BIRSO
TRADE MARK

NON-FERROUS CASTINGS and MACHINED PARTS for AIRCRAFT

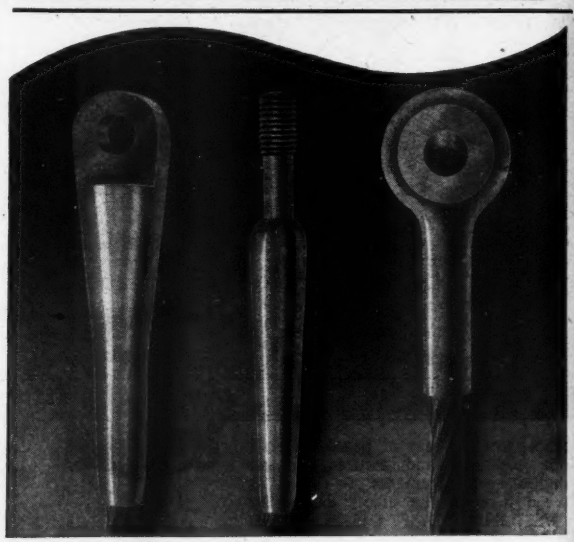
Also "BIRSO" CHILL-CAST RODS and TUBES, INGOT METALS, Etc.

B74a

Fully approved by Admiralty and A.I.D.

T. M. BIRKETT & Sons, Ltd.
HANLEY - STAFFS.

Telegrams: BIRKETT, HANLEY. *Telephone*: STOKE-ON-TRENT 2184-5-6

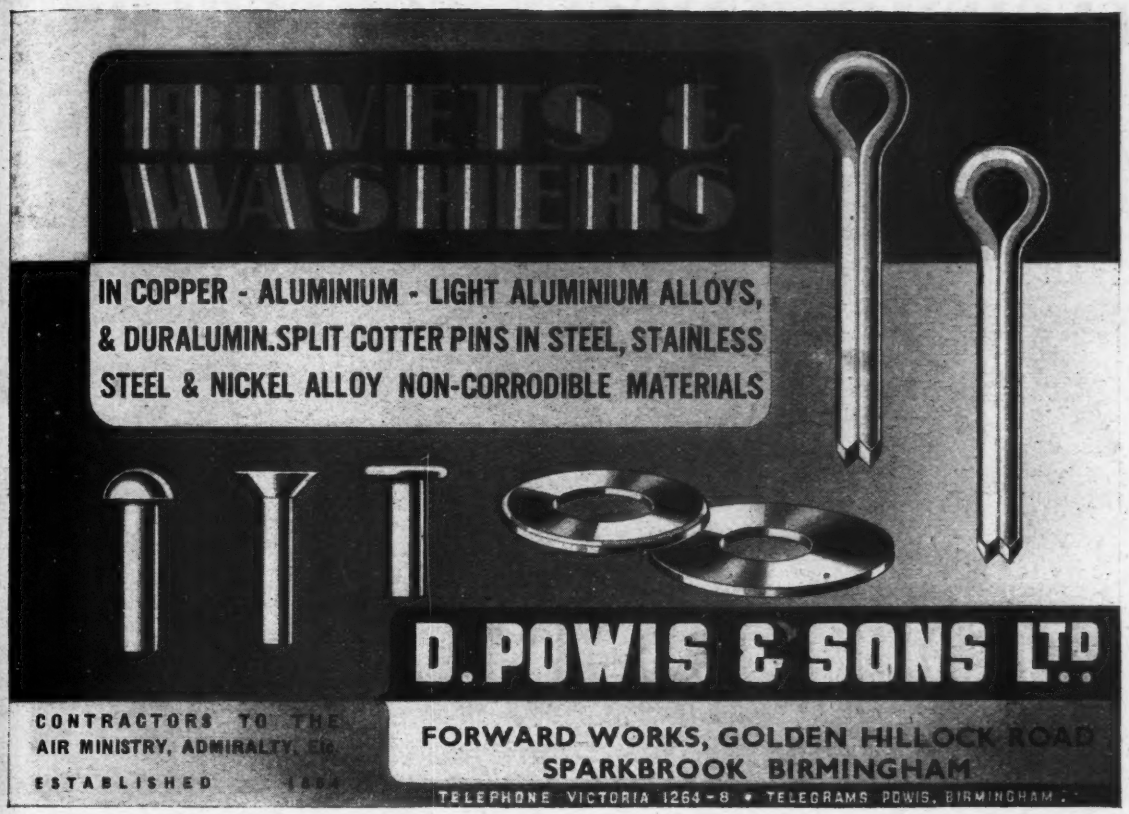


Swaged Terminals are attached without opening up the Rope or Cord. Thus, the original lay of the Rope is undisturbed. Together, Wire Rope and Swaged Terminals provide the full breaking load of the Rope or Cord.

Full particulars gladly sent on request.

BRITISH ROPES LIMITED

MANUFACTURERS OF WIRE ROPE · WIRE · HEMP CORDAGE AND CANVAS
HEAD OFFICE: DONCASTER · OFFICES · WORKS & STORES THROUGHOUT GREAT BRITAIN


RIVETS & WASHERS
IN COPPER - ALUMINIUM - LIGHT ALUMINIUM ALLOYS, & DURALUMIN. SPLIT COTTER PINS IN STEEL, STAINLESS STEEL & NICKEL ALLOY NON-CORRODIBLE MATERIALS
D. POWIS & SONS LTD.
CONTRACTORS TO THE AIR MINISTRY, ADMIRALTY, Etc.
ESTABLISHED 1864
FORWARD WORKS, GOLDEN HILLOCK ROAD
SPARKBROOK BIRMINGHAM
TELEPHONE VICTORIA 1264-8 • TELEGRAMS POWIS, BIRMINGHAM

HIGH CLASS SHEET METAL WORK

V.P. SHEET METAL LTD.

FUEL, OIL AND COOLANT TANKS
FABRICATIONS IN ALL METALS
EXPERIMENTAL AND PRODUCTION

WINDSOR ST. CHELTENHAM PHONE 5805

ENGINE COWLINGS *by* CORNERCROFT

Bristol Buckmaster. "Flight" Photo.

Cornercroft engine cowlings have been manufactured in thousands for all classes of aircraft, and we now have in hand orders for cowlings for post-war advanced type aircraft—reciprocating, radial and jet-propelled engines.

The Bristol CENTAURUS is one of the many modern aero engines cowled by Cornercroft.

CORNERCROFT LTD.

Coventry and Ashton-under-Lyne

GENERAL SHEET METAL WORKERS AND METAL SPINNERS TO THE AERONAUTICAL AND GENERAL ENGINEERING INDUSTRIES

CC.

HIGH STRENGTH LIGHT ALLOYS

BOOTH
BIRMINGHAM

We can place at your disposal experience covering 36 years of progressive development.

"DURALUMIN"
"DURAL"

REGISTERED TRADE MARKS

JAMES BOOTH & COMPANY, LIMITED,
ARGYLE STREET WORKS, BIRMINGHAM, 7
Telephone: EAST 1221. Telegrams: BOOTH, BIRMINGHAM 7

Designed for
MODERN AIRCRAFT

BECLAWAT FIXED OR DIRECT VISION PANELS OF ANY TYPE, AND COMPLETE HOODINGS

BECKETT, LAYCOCK & WATKINSON LTD., Acton Lane, London, N.W.10.
'Phone: ELGAR 5403-4-5. 'Grams: Beclawat, Phone, London.

LET US SOLVE YOUR PROBLEMS

Holdtite
SURRIDGE'S PATENTS

RUBBER ADHESIVES for all purposes, including Rubber to Metal, Wood, etc. Also Compounds and Dispersions. Technical advice gladly given on problems of adhesion.

SURRIDGE'S PATENTS LTD.
"NEW WORKS," CROYDON ROAD,
ELMERS END, BECKENHAM, KENT.
Telephone: BECKENHAM 0168/9. Telegrams: SURRIDGE, BECKENHAM.

The SPERRY A3 GYROPILOT

chosen for Britain's leading Transports!

POINTS THE WAY

SHORT "SHETLAND." Fastest flying-boat in the world. Great endurance and load carrying capacity combined with high cruising speed make the "Shetland" eminently suitable for trans-oceanic operation. **ESSENTIALLY SPERRY EQUIPPED.**

THE SPERRY GYROSCOPE COMPANY LIMITED GREAT WEST ROAD BRENTFORD

Air-Sea Rescue Equipment
for COMPLETE SAFETY

RUBBERISED FABRIC DEVELOPMENTS *BY* R·F·D COMPANY LTD

PNEUMATIC EQUIPMENT DESIGNED AND MADE TO SPECIAL REQUIREMENTS

AIRCRAFT DINGHIES AND FLOTATION GEAR WITH MANUAL, OR IMMERSION SWITCH OPERATING HEADS FOR AUTOMATIC INFLATION

AIRBORNE LIFE-BOATS, CANOES, FLOTATION BAGS, CO_2 INFLATION GEAR, LIFE-BELTS, BALLOONS, AIRCRAFT FABRICS

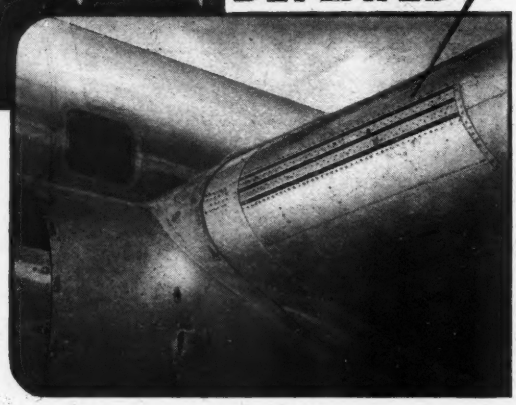
AIRCRAFT LIFTING BAGS, CANVAS HANGARS, TOW TARGETS, PARACHUTES, SAFETY HARNESS, PONTOONS, FABRIC FITTINGS

IF INFLATABLE, *consult* **R·F·D CO. LTD**

PIONEERS AND ORIGINAL INVENTORS

GODALMING, SURREY. *Telephone 1444*

ICE—the enemy DEFEATED



This photograph of the inter-nacelle section of the AVRO TUDOR II—and similarly on the Tudor I—shows the compact installation of the T.K.S. DE-ICING EQUIPMENT which is also distributed along the leading edge and wing tip of main and tail planes.

Many other aircraft manufacturers fit this equipment—in particular Handley Page "Hermes" and "Hastings"—Vickers-Armstrong "Viking"—Cunliffe-Owen "Concordia,"—realising that ice formation is an aircrafts greatest enemy.

T·K·S

AIRCRAFT

DE-ICING EQUIPMENT

T.K.S. (AIRCRAFT DE-ICING) LTD.

Proprietors—Tecalemit, Kilfrost, Sheepbridge-Stokes.

GREAT WEST ROAD, BRENTFORD, MIDDX.

'Phone: EALing 6661 (16 lines). 'Grams: DE-ICING, 'PHONE, LONDON.

T.K.S. 140

TELEPHONE: MANSION HOUSE 6156

BRITISH AVIATION SERVICES LIMITED

3, BIRCHIN LANE - - - LONDON, E.C.3

TELEPHONE: MANSION HOUSE 0444

THE BRITISH AVIATION INSURANCE COMPANY LIMITED

3/4, LIME STREET - - - LONDON, E.C.3

Make use of BA *Services*

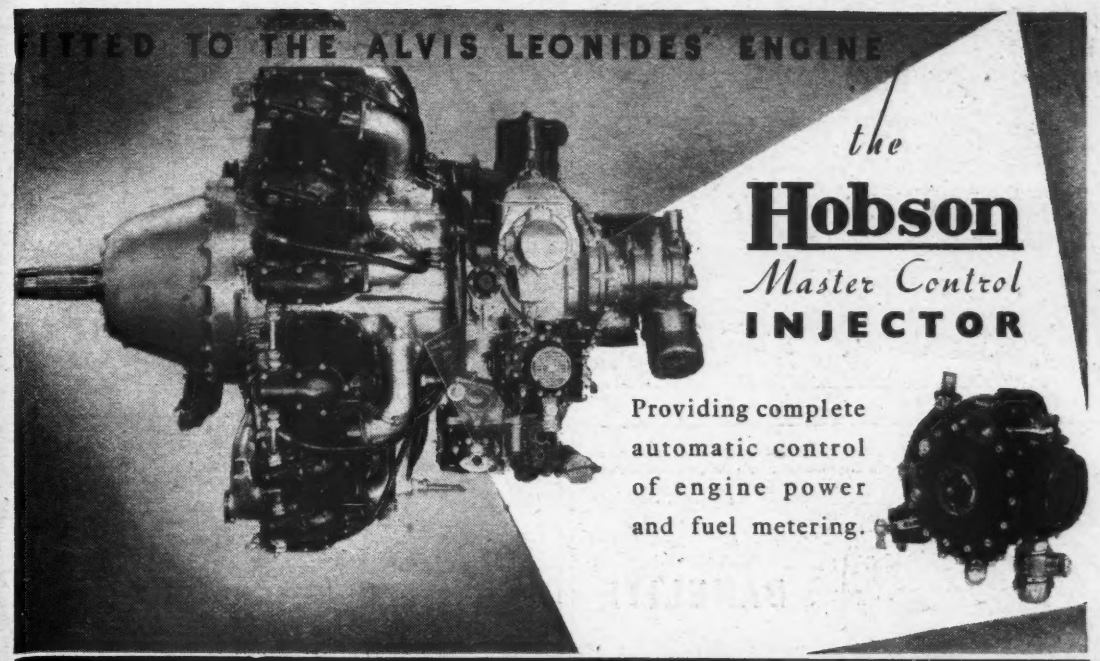
UNUSUAL SHAPES

are usually complicated, but always simple for production in

LAMINATED CELLULOSE FIBRE

PYTRAM LTD.

PYTRAM WORKS, DUNBAR RD., NEW MALDEN, SURREY


FITTED TO THE ALVIS LEONIDES ENGINE
the
Hobson
Master Control
INJECTOR
Providing complete automatic control of engine power and fuel metering.
H. M. HOBSON AIRCRAFT & MOTOR COMPONENTS, LTD

(Licensees in U.S.A. and Canada. Simmonds Aerocessories Inc.)

EVERYTHING IN SHEET METAL WORK

AND LIGHT ENGINEERING

AIRCRAFT
AUTOMOBILE
COACH AND BUS BODIES
Municipal and other ALL-METAL Vehicle Bodies

Refrigeration
COLD STORAGE
HEATING
DRYING
AIR Conditioning
MINING

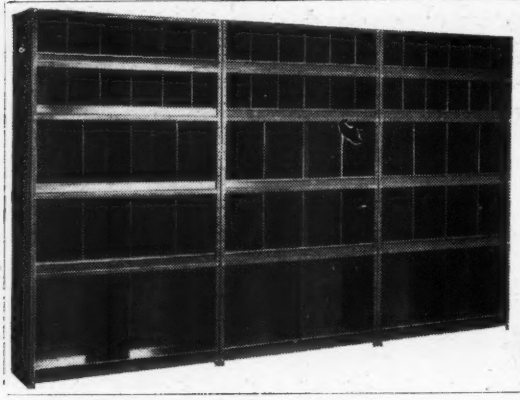
TELEGRAMS: BROMELPAR, SOUTHTOT LONDON

161, West Rd., TOTTENHAM

E. G. Brown & Co. Ltd

TELEPHONES: TOTTENHAM 2257, 2258 & 2259

LONDON, N.17

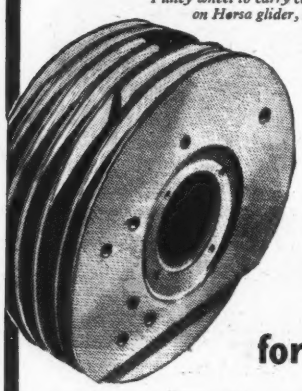


ARE YOUR STORES
ORGANISED FOR
TOTAL PRODUCTION

NOT IF YOUR EQUIPMENT
IS OUT OF DATE
FOR BINS, TOOL CABINETS, LOCKERS,
WORK BENCHES, ETC. *Prompt Deliveries.*

STONEHOUSE STEEL EQUIPMENTS
Phone: 0405/6/7 **WEST BROMWICH** Grams: "Steel," W.B.

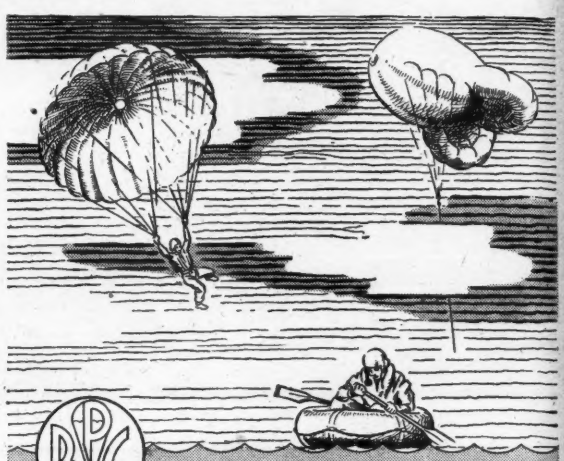
Pulley wheel to carry control cables for rudder and ailerons on Horsa glider, machined from Bakelite Laminated.



BAKELITE
TREFOIL
REGD. TRADE MARKS
LAMINATED
for hard service

Bakelite Laminated combines lightness with remarkable toughness. It is resistant to water, heat, acid, chemicals, oils, abrasion . . . gives excellent electrical properties . . . and can be machined to fine limits. The tensile strength of one standard grade exceeds 18,000 lb. per sq. inch. Available in 40 different grades and a variety of forms including sheets up to 6 inches thick, rods, tubes and special shapes. Further information on request.

BAKELITE LIMITED
Pioneers in the Plastics World
18 GROSVENOR GARDENS · LONDON · S.W.1
T59



B.P.C. *The* **mark of Perfection in Safety Equipment**
NOW for EXPORT
We invite enquiries from abroad for
PARACHUTES BALLOONS DINGHIES
THE BRITISH PARACHUTE CO., LTD. CARDIFF TEL CARDIFF 8735-6-7

Our speciality is the design and manufacture of fractional horse-power motors to the needs of aircraft makers.

These small Croydon motors have a large number of operational flying hours to their credit. A severe test of their performance and proof of their reliability under all conditions.

Consult CROYDON

Croydon Engineering Co. Ltd., Commerce Way, Purley Way, Croydon. Phone: 4125/8

Pitchfords 2384

FLYING SUITS

in fine quality serge, finished drill. Zip fastening front, legs and cuffs. In khaki, white or navy ... 47/6
(4 Coupons required)

COMBINATION FLYING SUIT, in super quality fawn gabardine. Heavy fleece lined, zip front, legs, etc., £7.15.0
(18 Coupons)

LEATHER and GABARDINE JACKETS, ¾ length. Fleece lined, zip front and cuffs.

LUXOR GOGGLES, 50/-. TRIPLEX GOGGLES, from 7/6 and 17/6.

NATURAL SHEEPSKIN GLOVES, lambswool lined, 32/6 per pair. Double texture SILK UNDER-GLOVES, 22/6 per pair. (2 Coupons).

PRICES INCLUDE PURCHASE TAX.
Catalogue on receipt of 1d. stamp.

TURN UNWANTED KIT INTO CASH.
We pay TOP PRICES for *worn* Irvine type jackets, sheepskin lined boots and jackets, leather jackets, flying suits, etc. Call or write
If writing, state full particulars.

D. LEWIS LTD. (Dept. F.)

124, GT. PORTLAND ST., LONDON, W.1
No other London address.
Tel.: Museum 4314. Tele.: Aviakit, Wesdo, London

Good Progress in the AIRCRAFT INDUSTRY

is open to those who avail themselves of the services of the I.C.S., the world's largest and greatest school teaching by post.

Men who are eligible for the **Air Ministry's Examinations in Categories A, B, C and D** will find the I.C.S. Ground Engineer's Course a sound preparation for success.

We also offer fully adequate instruction to those who wish to enter the **Drawing Office** or to specialise in **Aero Fitting and Rigging** or **Aero-Engine Fitting.** And we have special Preparatory Courses for **R.A.F. Entrants.**

Special terms for members of H.M. Forces

Write to the I.C.S. Advisory Department for booklet of particulars of our Courses in Aeronautical Engineering.

INTERNATIONAL CORRESPONDENCE SCHOOLS, LTD. ICS
Dept. 182, International Buildings, KINGSWAY, LONDON, W.C.2

The London School of Air Navigation Ltd.
21, WATER LANE, EASTCHEAP, E.C.3 Tel.: Royal 1136
Directors:
S./Ldr H. G. Holmes, D.F.C., W./Cdr. D. M. Brass, D.S.O.
COURSES for
'A' LICENCE 'B' LICENCE
1st CLASS NAVIGATORS
2nd CLASS NAVIGATORS
POSITIONS NEGOTIATED ON MERIT

Rate 3/- per line, minimum 6/-, average line 6-7 words. Special rates: Auctions, Contracts, Patents, Legal and Official Notices, Public Announcements, Tenders, 6/- per line, minimum 9/- per paragraph. Box Nos., add 2 words, plus 1/- for postage and forwarding replies. Press day, 1st post Friday. No responsibility accepted for errors. Remittances payable to: "Flight" Publishing Co. Ltd., Dorset House, Stamford St., London, S.E.1.

AIRCRAFT FOR SALE AND WANTED

AUSTER Distributors for Yorkshire.

ARNOLD G. WILSON, Ltd., 232, Harrogate Rd., Leeds, 7 Tel. 41014-5. Demonstrations anywhere, anytime. [0257

AIRWORK, Ltd., 134, Bath Rd., Hounslow. Tel. Hounslow 5451. See page 9. [0255

AIRSPEED Envoy 7 passengers, Cheetah 9 engines, fitted radio, fully overhauled, with C. of A.

AUSTER 3-passenger, brand new, with C. of A.; immediate delivery.

PROCTOR 3-passenger, as new throughout, with C. of A.

HORNET Moth Gipsy Major, C. of A., completed in four weeks.

BREVET FLYING CLUB, Ltd., 11, Chesterfield St., Mayfair. Gros. 1417 & 1353. [0248

MARSHALLS OF CAMBRIDGE have the following aircraft for immediate disposal.

TIGER Moth with C. of A. to 17/12/46; price £775.

TIGER Moth with C. of A. to 16/1/47; price £850.

ALSO new Cirrus Minor 90hp series I engine; price £275. [7221

2-4-SEATER cabin aircraft required, with C. of A., for private use.—Box 114, c/o *Flight*.

W. S. SHACKLETON, Ltd., require urgently all types of civil aircraft for resale; we also wish to purchase immediately a Gipsy Major I and II and a Cirrus Minor I engine.

W. S. SHACKLETON, Ltd., offer:—

£775—Tiger Moth, latest Gipsy Major engine, C. of A. until December, 1946; in perfect order; equipment includes dual controls, full blind-flying, parachute seats, etc.

£850—Tipsy Trainer, only 8 hours since C. of A. in April, and under 200 hours since new; formerly the property of Air Chief Marshal Sir Arthur Longmore; absolutely perfect condition, indistinguishable from new; cruising speed 105 mph at 3½ gallons per hour.

W. S. SHACKLETON, Ltd., also offer:—

TIGER Moths.—We have four more undergoing overhaul; Cygnets; we offer 3 of these outstanding all-metal tricycle undercarriage monoplanes, now undergoing overhaul by the makers.

INCIDENTALLY we offer a batch of brand new 8-day Time of Flight clocks, highest grade jewelled Swiss lever movements; £7/19/6 each.

W. S. SHACKLETON, Ltd., 175, Piccadilly, London, W.1. [0070

AIRCRAFT urgently required for training and charter work, with or without C. of A.; highest prices paid.—Brevet Flying Club, Ltd., 11, Chesterfield St., Mayfair, W.1. Gro. 1353 and 1417. [0249

MARSHALL'S FLYING SCHOOL, Ltd., for new and second-hand aircraft; part exchanges; sales and service repeat service.—The Airport, Cambridge. Tel. 56291. [0245

AIRCO, Ltd., suppliers of aircraft, accessories and equipment. Export inquiries invited.—Eagle House, 109, Jermyn St., London S.W.1. Tel.: Whitehall 8863. [6949

McDONALD AIRCRAFT, Ltd., Balado Airport, Kinross, sole Scottish agents for Percival aircraft, demonstrations arranged with Proctor V; agents for Slingsby gliders.—Tel. Kinross 3253-4.

CECIL KAY AIRCRAFT, Ltd., 10-20, Essex St., Birmingham, are Midland distributors for Auster and Percival aircraft; place your order now for early delivery; demonstrations can now be given. [0233

McDONALD AIRCRAFT, Ltd., Balado Airport, Kinross.—B.A. Swallow, Cataract Series II engine, full C. of A., engine completely overhauled, in beautiful condition; £625.—Tel. Kinross 3253-4. [0267

R. K. DUNDAS, Ltd., 4, St. James's St., S.W.1. Whitehall 2848.—In inviting your enquiries for all types of aircraft, aero engines spares and accessories, draw particular attention to the following for immediate sale:—

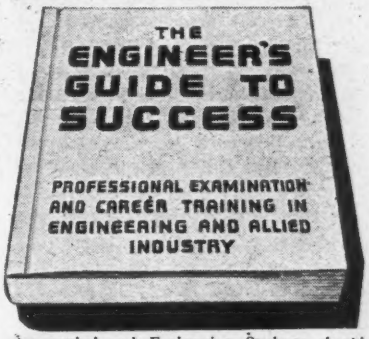
STINSON Voyager 3-seater cabin monoplane, repainted, 85hp Continental; £850.

MONOSPAR, 12 months C. of A., total hours under 500, both Pobjoy engines completely overhauled, 4 seats plus pilot, full blind instruments, folding wings, navigation and landing lights; price including two new spare engines, £2,300. [0212

KENNINGS, Ltd., Taylorcraft, Auster and Percival Proctor distributors, are in a position to give demonstrations to prospective purchasers.—Full details obtainable from the distributors, Kennings, Ltd., Queen St., Derby. Tel. 3636. 232, Cheetham Hill Rd., Manchester. Tel. Bla. 9111. [0235

FIRST PLACE COURSES

THIRTY-SEVEN FIRST PLACES have been gained by the home-study students of the T.I.G.B. in the A.F.R.Ae.S. Examinations of the Royal Aeronautical Society—a great and unapproached record.



Aeronautical and Engineering Students should particularly note that both Government and Industry have publicly stated that young men with technical knowledge and qualifications are to receive every chance of rising to the highest positions within their capacity in post-war industry. Write to-day for "The Engineer's Guide to Success"—free—and use the FIRST PLACE COURSES of the T.I.G.B. to obtain qualifications and success.

THE TECHNOLOGICAL INSTITUTE OF GREAT BRITAIN,
37, Temple Bar House, London, E.C.4.

ENGINEERING OPPORTUNITIES

IMPORTANT GUIDE

This unique handbook, "Engineering Opportunities," outlines over 200 Courses of technical instruction, including **Aeronautical Engineering, Aeronautical Design, Aero Engines, Air Navigation, Ground Engineers' Licences. A.F.R.Ae.S., A.M.I.Mech.E., R.A.F. Maths.**, etc., etc. Our Courses have been approved by the **Royal Aeronautical Society** and

WE GUARANTEE
"NO PASS—NO FEE"

A copy of this enlightening guide to well-paid posts will be sent on request—**FREE.**

BRITISH INSTITUTE OF ENGINEERING TECHNOLOGY
306, Shakespeare House,
17-19, Stratford Place, London, W.1.

SPEED OF THE WIND on

Scott MOTOR CYCLES!

SCOTT MOTOR CYCLE CO. SHIPLEY, YORKS.

BATTERY TERMINALS · STUDS

to the specific requirements of our customers.

Bar Repetition Products made specially to Air Ministry Requirements.

Makers of all types of repetition products from the bar in metals.

M·C·L and REPETITION Ltd Pool Lane, Langley, Bham.
Phones: BROadwell 1115 (4 lines) BROadwell 1757.

FLEXIBILITY

Air Transport College offers you an opportunity to study for a PILOT'S or NAVIGATOR'S LICENCE at your own speed and in the quiet of your own room. Whether you wish to take a complete Course, or only to revise one small Section thereof, the College can give you the coaching which you need. If you prefer that the fee for your Course be spread over a period rather than paid in full on enrolment, that also can be arranged.

Everything that can be done to ease the difficulties of a candidate for a Licence has been done, and particular care has been given to this question of FLEXIBILITY. There is almost certain to be a Course to suit your particular needs

How can we help you?

Descriptive booklets on the PILOT'S "B" LICENCE and NAV'GATORS' LICENCES are free on request.

PRELIMINARY NOTICE

OXFORD FLYING CLUB

OPENING 1st JULY, 1946

★ Moth and Tiger Moth available for Ab-initio Instruction, Blind Flying etc.

★ Dual £4 per hour and Solo £3 per hour on above types.

★ *For further particulars write or telephone,*

OXFORD FLYING CLUB,
(Props., Airtraining (Oxford) Limited),
Kidlington Aerodrome, Oxford.

Telephone Number: Kidlington 201.

Fit an 'OILCOIL'

Guaranteed to improve life of any car, van or lorry. Increased power, improved petrol consumption, better starting. *Send for interesting booklet "1.7."* From all Factors or direct.

RUNBAKEN · MANCHESTER · 1

AIRCRAFT FOR SALE AND WANTED

FIELD AIRCRAFT SERVICES, Ltd., London Air Park, Hanworth, Middlesex (Tel. Feltham 3221), offer reconditioned Percival Proctor aircraft for sale, priority given for export, early delivery; price £1,300. Field Aircraft Services are approved agents for spares for Proctors. Our sales and service organisation welcome your enquiries for all types of new and used aircraft, engines, accessories, etc. [0258

AIR CHARTER

AIR charter and taxi.

HUNTING AIR TRAVEL for door-to-door service, inland or overseas; basic rates below refer to hire of aircraft, irrespective of numbers of passengers carried; Proctor (3 passengers), 1/6 per mile; Rapide (5 passengers), 2/6 per mile

HUNTING AIR TRAVEL, Ltd., Head Office, 29, Old Bond St., London, W.1. Tel. Regent 5211. Cables, Aircharta Piccy. [0256

PHILIPPA BENNETT for air taxi service; 1/- per mile.—Southampton Airport. Tel. Eastleigh 87697. [7123

McDONALD AIRCRAFT, Ltd., Balado Airport, Kinross. Tel. Kinross 3253-4, for air taxi and aircraft hire services any time, anywhere, from 1/- per mile. [0266

MARSHALLS for charter service, with 2-8-seater aircraft, from 1/- to 2/6 per aircraft mile.—Marshalls' Flying School, Ltd., The Airport, Cambridge. Tel. 56291. [0246

MODERN AIR SERVICES, Ltd., Gatwick Airport, Surrey.—Charter and taxi aircraft, 1/6 per mile; direct rail service to airport from Victoria and London Bridge.—Write for further details or telephone Crawley 568. [7027

ANGLO-CONTINENTAL AIR SERVICES are now in a position to offer two passenger aircraft at 1/- per mile; passengers picked up and conveyed anywhere; larger aircraft later.—Tel. or write, Anglo-Continental Air Services (Burford 234)), Oxon. [7162

AIRCRAFT SERVICING

FIELD AIRCRAFT SERVICE,

CROYDON, Hanworth, Luton, Nottingham.

NEW and used aircaft.

C. of A. overhauls, repairs, modifications and conversions, maintenance and service contracts, engine repair and replacement service, tool and component manufacture.

FIELD CONSOLIDATED AIRCRAFT SERVICES, Ltd. (A.R.B. approval No. A1 1074/38). Head office: Great Woodcote House, Woodcote Drive, Purley, Surrey. Tel. Wallington 7001. Telegrams and Cables: Fieldair, Purley. [0252

SOUTHERN AIRCRAFT for repair and overhaul of ex-Service machines.

SOUTHERN AIRCRAFT for sales and exchange of any aircraft.

SOUTHERN AIRCRAFT for charter of aircraft.

SOUTHERN AIRCRAFT welcomes visitors to inspect factories.

SOUTHERN AIRCRAFT (GATWICK), Ltd., Gatwick Airport Surrey Tel. Crawley 811; Telegraphic, Southernair. [0263

ROLLASON for repairs, overhauls and servicing (approved by A.R.B.).

ROLLASON for C of A.s; ex-R.A.F. aircraft a speciality.

ROLLASON for everything aeronautical.

ROLLASON for spares, including Rapide, Moth Minor, Auster, Cirrus engines.

W. A. ROLLASON, Southampton Airport. Tel. Eastleigh 87236-7. [6994

MARSHALLS for servicing, repairs and C. of A. overhauls.—Marshalls' Flying School, Ltd., The Airport, Cambridge. Tel. 56291. [0247

CARLUX (SCOTLAND). Ltd., Main St., Prestwick (Ayrshire).—Aero-electrical service for magnetos, generators, starter-motors, B.T.H. and Rotax service.

WESTERN AIRWAYS for speedy and economical C. of A. overhauls or conversions, any type of aircraft, rapid completion, collection or delivery any part of the country or abroad, let us quote for your requirements.—Tel. Weston 2700, or write Airport, Weston-super-Mare. [7072

AIRWORK, Ltd., can undertake immediate C. of A. overhaul for all types of aircraft; Airwork, Ltd., have up-to-date branches throughout the United Kingdom available for this work; quotations given.—Airwork, Ltd., Westbrook House, 134, Bath Rd., Hounslow, Middx. [6743

T. McDONALD & Sons, aeronautical engineers, Leven, Fife, can place at your service full facilities for the servicing, repairing and C. of A. overhauls, large or small wood or metal aircraft; engine overhauls a speciality, estimates free.—Solo Scottish agents for Percival Aircraft. Tel. Leven 444. [6859

Aero & Jig & Tool Draughtsmen in Great Demand

MEN AND YOUTHS

There is an insatiable demand for Aero, Jig and Tools, etc., Draughtsmen and Inspectors. So acute is the present shortage that employers are only too anxious to engage those with no previous practical experience who are able to prepare neat and accurate drawings.

QUALIFY AT HOME—IN SPARE TIME

After brief, intensely interesting study—undertaken at home in your spare time—***YOU*** can secure an attractive and interesting post as **Aero-Draughtsman.** Numerous vacancies are also available in **Electrical, Mechanical, Plastics,** etc., branches of Draughtmanship.

FREE GUIDE

The Free Guide contains 132 pages of information of the greatest importance to those seeking such success compelling qualifications as **A.M.I.Mech.E., A.F.R.Ae.S., A.M.I.P.E., A.M.I.E.E., Matric. and B.Sc.,** etc., also **R.A.F. Entry** (Maths., etc.), together with particulars of our remarkable Guarantee of

SUCCESS—OR NO FEE

Write now for your copy of this remarkable publication. It may well prove to be the turning point in your career.

NATIONAL INSTITUTE OF ENGINEERING

(Dept. 427), 148-150, HOLBORN, E.C.1

(South Africa Branch E.C.S.A., P.O. Box 8417, Johannesburg.)

GOVERNMENT RELEASE

ROYAL AIR FORCE

FLYING SUITS

FREE OF COUPONS. **32/6** Postage 1/- extra.

Officially released by H.M. Government. These suits are in first-class condition and are an amazing bargain. Made of heavyweight rubberized material, windproof and waterproof. Zip fasteners on sleeves, legs and down front. An ideal garment for motor cyclists, lorry drivers, etc., etc. All sizes available—state chest and height when ordering. Limited supplies—cash back if dissatisfied. Also quilt inner linings at 17/6 each.

WILLSON BROTHERS

45/47, UPPER HIGH STREET,

EPSOM, SURREY. *'Phone: Epsom 1293*

COTTON BAGS

IN ANY COLOUR OR SIZE
WITH OR WITHOUT LABELS

FUTURIST SOFT FURNISHING COMPANY

Rookwood Works, Sandown Park, Liverpool, 15

A.I.D. Approved No. 3599/42

SBAC THE SOCIETY OF BRITISH AIRCRAFT CONSTRUCTORS

AMAL

THE SOCIETY OF MOTOR MANUFACTURERS & TRADERS LTD

QUICKER-STRYP No. 32

REMOVES HIGH TEMPERATURE STOVED ENAMEL. CELLULOSE WITH LEAD FILLER FRENCH POLISH VARNISH & THIN COATS OF PAINT IN ONE APPLICATION

IMPORTANT QUICKER STRYP No. 32 Now Available Only to Users of AIRCRAFT PRODUCTION

This world-famous stripper is guaranteed acid and alkali free, non-inflammable, and non-injurious to eyes, skin or clothing.

It works rapidly and thoroughly, strips down to the bare wood, metal or glass *in one application* and, being non-volatile, does not dry up or leave a sediment. Usable to the last drop.

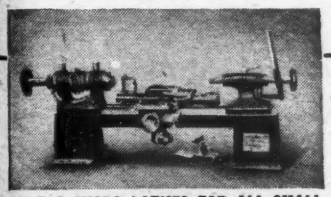
It has been used for many years, and with entire satisfaction, by the British Aircraft and Automobile Industries.

Owing to shortage of materials we are still producing and supplying QUICKER-STRYP WAR TIME SUBSTITUTE No. 32, which, like the original it temporarily replaces, is still the best on the market.

Due to control, supplies are available only for work of national importance.

QUICKSTRYP CHEMICAL CO LTD.
104, Morley Street, Bradford.
We find exclusively in Paint Removers. Ask for descriptive leaflet of our Products.

For Economy use QUICKER-STRYP



PULTRA MICRO LATHES FOR ALL SMALL PRECISION INSTRUMENT WORK.

Centre Height: 50 mm. Spindle Bore: 10 mm.
Speed Range: 400 r.p.m. to 6,000 r.p.m. for motorised model.

MANY ACCESSORIES AVAILABLE also for GRINDING and GEAR CUTTING.
Write for Catalogue C 44.

PULTRA LTD., 24, GRAVEL LANE, SALFORD, 3, MANCHESTER. Telephone: BLA 9181.

Quick deliveries
OF CASTINGS FOR
AIRCRAFT JIGS
AND FIXTURES. ALSO ALL TYPES OF MEEHANITE CASTINGS LET OUR REPRESENTATIVE CALL ON YOU. WRITE TO
WINGET LTD ROCHESTER KENT

COTTON BAGS
FOR SPARE PARTS, Etc.
WALTER H. FELTHAM & SON, LTD.,
Imperial Works, Tower Bridge Road,
Telephone: HOP 1784. **London, S.E.1**

AIRCRAFT SERVICING

McDONALD AIRCRAFT, Ltd., Aeronautical Engineers, Balado Airport, Kinross, can place at your service full facilities for the servicing, repairing and C. of A. overhauls, large or small, wood or metal aircraft; engine overhauls a speciality, estimates free; hangarage and service facilities at reasonable rates for private aircraft owners.—Tel. Kinross 3253-4. [0264

AERONAUTICAL ENGINEERS AND AGENTS

R. K. DUNDAS, Ltd.—Aeroplanes, engines, aeronautical equipment and accessories; agents, at home and abroad, for the Aircraft and Allied Industries; branches and agents throughout the world.—Head Office: 4, St. James's St., S.W.1. Tel. Whi. 2848. [0215

AIRCRAFT TRANSPORT

LEP TRANSPORT, Ltd., leading transport, packing and shipping contractors to the Government, aircraft manufacturers and operators; air freight specialists.—Sunlight Wharf, Upper Thames St., E.C.4. Central 5050 (20 lines). [0262

BOOKS, ETC.

UNDAMAGED "Flights" and "Aeroplanes," 3d. ea.; ditto, about 2 pages missing, 1½d. ea.; carriage extra; enquiries with s.a.e.—Box 411, c/o *Flight*.

FOR sale, in good condition, complete issues of "Flight" for 1941 to 1945 inclusive, with the exception of one copy only.—Box 471, c/o *Flight*. [7220

CAR HIRE SERVICE

FORCES personnel on leave from abroad requiring cars should apply at Wilson's (Brixton), Ltd., Trinity Gardens, London, S.W.9. Brixton 4011. [0228

CARS WANTED

CARS bought for cash, any condition.—Wilson's, Coachworks, 16, Trinity Gdns., S.W.9. Brixton 4011.

CONSULTANTS

CONSULTANT scientist specialises in unusual problems.—Enq. invited, trade or private.—Box 5752.

S. J. NOEL-BROWN & Co., the Industrial Management Consultants, and their Associates, are now in a position to consider forward contracts and assignments, home or overseas, in regard to production and material control and time and motion study; general investigation and contractual services are available at short notice.—Gt. Peter House, 2, Lord North St., Westminster, S.W.1. Tel. Abbey 2126 (5 lines). Grms. Gayfere Sowest, London. [0210

CLUBS

WILTSHIRE FLYING CLUB.

INSTRUCTION £3 per hour for A, B and Instructor's Licences; please write for booklet.—High Post Aerodrome, Salisbury. Tel. Middle Woodford 57.

UNITED Services Flying Club (all civil and military services), Elstree Airfield, and 107, Park Lane, Mayfair 6444. [7215

HERTS and Essex Aero Club, Broxbourne Aerodrome, 15 miles from centre of London, L.N.E.R. from Liverpool St., or Green Line, route 715, every 20 minutes, from Broadcasting House; flying training in Tiger Moths, Auster or Hornet Moth; dual £3/5, solo £3 per hour; charter trips in Proctor aircraft, anywhere; full facilities for servicing, repairing and C. of A. overhauls; estimates free; residential clubhouse, restaurant; trial lesson, half-an-hour in the air with instructor, 30/-.—Tel. Hoddesdon 2453, 2421 and 3180. [0230

FINANCIAL

CAPITAL required to develop the world's finest light land and amphibious aircraft, patented Great Britain and America; solicitors' and bankers' references.—Box 467, c/o *Flight*. [7216

HOTELS AND ACCOMMODATION

ROYAL OAK HOTEL, Keswick-on-Derwentwater, heart of English Lake District; offers restful holiday to Air Force personnel; first class accommodation at reasonable charges. [0814

PACKING AND SHIPPING

R. & J. PARK, Ltd., 143-9, Fenchurch St., E.C.2. Tel. Mansion House 3083. Official packers and shippers to the aircraft industry. [0012

PATENTS

THE proprietor of British Patent No. 536057, entitled "Multiple Motor Drive for Aircraft," offers same for license or otherwise to ensure practical working in Great Britain.—Inquiries to Singer, Ehlert, Stern & Carlberg, Steger Building, Chicago 4, Illinois, U.S.A. [7172

TUITION

THE LONDON SCHOOL OF AIR NAVIGATION, 21, Water Lane, Eastcheap, E.C.3. TELEPHONE: Royal 1136.

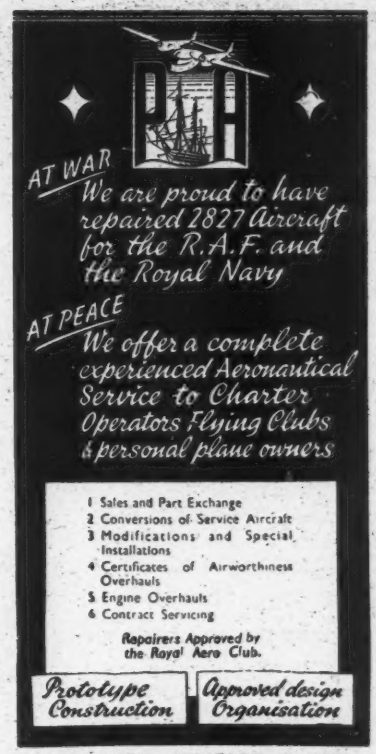
COURSE (warrant holders only) starts 1st July, "B" licence and/or 2nd Class Navigators. [7178

AIRCRAFT or Automobile Engineering.—Candidates will be admitted for the term commencing October 8, for a probationary period of practical engineering training and vocational guidance for entry to either industry.

COLLEGE OF AERONAUTICAL ENGINEERING, College House, Princes Way, Wimbledon Park, S.W.19. [0199

WIRELESS telegraphy.—Postal courses of instruction for P.M.G.; certificates for Merchant Navy, and Air Ministry for Civil Aircraft.—Apply British School of Telegraphy, Ltd., 179, Clapham Rd., London, S.W.9. (Brixton 3847.) Estab. 36 years. [0218

FLYING tuition on Tiger Moth and Auster aircraft at £3 per hour day, and £4 per hour night; also tuition on Proctors and Rapides available; aerodrome 2 miles from Cambridge, with first class restaurant; qualify for your Pilot's "A" and "B" and/or Instructor's licences at Marshalls' Flying School, Ltd., The Airport, Cambridge. Tel. 56291.


AT WAR
We are proud to have repaired 2827 Aircraft for the R.A.F. and the Royal Navy
AT PEACE
We offer a complete experienced Aeronautical Service to Charter Operators Flying Clubs & personal plane owners
1 Sales and Part Exchange
2 Conversions of Service Aircraft
3 Modifications and Special Installations
4 Certificates of Airworthiness Overhauls
5 Engine Overhauls
6 Contract Servicing
Repairers Approved by the Royal Aero Club.
Prototype Construction
Approved design Organisation

PORTSMOUTH AVIATION LIMITED
THE AIRPORT, PORTSMOUTH Tel. Portsmouth 74174

JOIN THE

FAIR OAKS AERO CLUB

(Members of the Association of British Aero Clubs.)

- ★ Nearest Station is Woking, only 30 minutes from Waterloo.
- ★ Car Hire Service available to meet trains.
- ★ Auster and Moth Aircraft available for Instructional and Solo Flying.
- ★ Flying Rates: Dual £4 per hour, Solo £3 per hour, on above types.
- ★ Private Owners' aircraft housed.
- ★ Full maintenance facilities available.
- ★ C.s of A. and Inspections can be carried out on all types of aircraft. A.R.B. Approval No. A.I./2249/46.

★ *For further particulars write or telephone*
The Secretary,
Fair Oaks Aero Club,
(Props.: Airtraining (Fair Oaks) Limited),
Fair Oaks Aerodrome,
Chobham, Surrey.
Telephone: Chobham 288.

W.B.Bawn

Sheet Metal Work · Steel Plate Work · Fabricated Welded Steel Work in any thickness · Profile Gas-Cutting · Hydraulic Press-work · Engine Test Beds · Machine-Shop Work · A.I.D. approved

ENGINEERS AND CONTRACTORS

Byron Works · Blackhorse Lane · London, E.17

Phone: LARkswood 4411-3 *Grams: Bopeep, Walt, London*

& COMPANY, LIMITED, FOR HEAVY METAL WORK

MISCELLANEOUS

MONOMARK; permanent London address; letters redirected, 5/- p.a.—Write BM/MONO88, W.C.1.

LAGONDA 1931 2-litre, supercharged, tyres and cond. excellent; £425.—Tel Jenkins, Whitehall 2848. [7198

R.A.F. officers' uniforms purchased; new and re-conditioned, kit for sale.—Fishers, 88, Wellington St., Woolwich. Tel. Woolwich 1055. [6196

COMPLETE R.A.F. outfits for newly commissioned officers, in stock or to measure; write for price list.—Fishers, 8, Wellington St., Woolwich [6978

AEROPLANES, brass scale models, 60 types chrome finished and unfinished castings, accessories; list 2½d stamp.—Gibb, 153, Oxford St., Glasgow. [7143

AEROPLANE photographs.—Over 3,000 warplanes of all nationalities and historical aircraft; list 20W, price 1/-; photographs (5½×3½in.), 7/- per dozen.—Real Photographs Co., Ltd., Victoria House, Southport. [7167

PLANE refuelling.—Tanker on Albion 1938 24hp chassis, very low mileage, exceptional condition, fitted with high output pump driven from engine, three outlet hoses on adjustable height arms to fill up to 3 tanks simultaneously.—Box 468, c/o *Flight*. [7217

CAR cruiser, 15ft, D.P., four-berth, gas cooking and lighting; £295; H.P. terms arranged; delivery 1/- per mile; also in stock 20 others to choose from, new and second-hand.—F.O.C. Caravan Centre, 206, Cricklewood Broadway, N.W.2. Gladstone 2234. [0207

OILSKINS free of coupons.—Surplus from public utility company and reconditioned as new; suit consists of heavy black oilskin ¾ length coat, shoulders interlined, button to neck, with storm collar, also heavy black oilskin trousers, guaranteed absolutely waterproof; price 35/- per suit, postage 1/- extra; sou'-wester to match, 3/- extra; all sizes orderable; state chest and waist measurement when ordering, limited supplies; cash back if dissatisfied.—Willson Brothers (Dept. 14), Epsom, Surrey [0234

A CARAVAN tombstone when I die? I've lived in, eaten, slept and thought caravans for nine years and edited a caravan paper, and I have a gigantic selection of the best new and second-hand vans at lower prices. This week's snips: Raven Wizard, £300; 18ft Cheltenham Eland, full size bath and gas cooker, hot water system, lavatory, 3 doors, Pither stove, £735; also the new 1946 Eccles, the new Ensor, with extending kitchen, car trailer "Countess" and unequipped caravan shells; really easy terms.—A. S. Jenkinson, on the main Bath Rd., Taplow, Bucks. Tel. Maidenhead 2610. 5 minutes' direct walk Taplow (from Paddington) Station. Maidenhead ½ mile. [7211

PERSONAL

TOM LONG tobacco's simply it,
So smokers say when pipes are lit. [0026

SITUATIONS VACANT

B LICENCE pilot with twin engine experience required.—Box 437, c/o *Flight*. [7205

PROCESS planning engineer required, capable of planning, scheduling and estimating production times.

RATEFIXER required, with practical experience in welded tube assemblies.

JIG and tool draughtsman required for assembly jig design and factory layout work.

AIRCRAFT factory near Exeter.—Write, giving details of experience, age and salary required, Box 202, c/o *Flight*. [7161

RADIO operator required immediately (P.M.G. licence), permanency.—Write Modern Air Services, Ltd., Gatwick Airport, Surrey. [7168

CHIEF planning engineer required by experimental aero engineers in Home Counties.—Write, stating age, experience and salary required, to Box 242,

GROUND Engineer, Cat. A. and C. for Austers (Cirrus) aircraft at Macmerry Aerodrome.—Full particulars to Secretary, Edinburgh Flying Club, 50, Melville St., Edinburgh. [7191

WANTED, for Olley Air Service, Ltd., Croydon, first class radio officers with aircraft endorsement to licence, for charter work; highest salaries paid to suitable applicants. [7195

SITUATIONS VACANT—CONTD.

ENGINEERING department of aircraft firm 30 miles north of London require design draughtsmen and senior detail draughtsmen; experience in light hydraulics would be an advantage.

APPLICATIONS are also invited from tracers, also clerks, preferably with some knowledge of drawing office system; office juniors are also required, and eventual openings for such in the apprenticeship scheme may be available.—Apply in writing to Box 415, c/o *Flight*. [7204

FLYING Instructor-Manager, for Edinburgh Flying Club, Macmerry Aerodrome, required for July 1, on salary and commission basis.—Full particulars to Secretary, 50, Melville St., Edinburgh, 3. [7190

EXPERIENCED airframe stressmen and draughtsmen required.—Write, stating experience, qualifications and remuneration, to the Personnel Manager, The Fairey Aviation Co., Ltd., Hayes, Middlesex.

AIR hostess wanted for aircraft operating from England to overseas; write, giving full particulars, including age, weight, air experience, knowledge of foreign languages, and first aid, etc., to: Box 441,

PILOTS holding instructional qualifications and/or B licence, and who are willing to free-lance, are invited to communicate with advertisers, giving full particulars (confidential).—BM/ELKG, London, W.C.1.

EXPERIENCED upholsterer required for aircraft work.—Please write, stating experience, etc., to Staff Superintendent, Airwork General Trading Co., Ltd., Gatwick Airport, Horley, Surrey. [7175

PILOTS wanted, age 25-30 years, experience at least 1,000 hours; salary £750-£1,200.—Applications, with photo and full information of flying experience, to Danish Air Lines, 67, Pont St., London, S.W.1. Only written applications. [7197

PILOT with not less than 2,000 hours' experience required by air charter company; must hold current "B" licence; preference given to one also holding 2nd Class Nav. Certificate; excellent prospects to the right type of pilot.—Box 458, c/o *Flight*.

REQUIRED immediately, a number of senior draughtsmen and stressmen, preferably with aircraft experience, for development and research work in Midland area.—Reply, stating experience, qualifications, etc., and salary required, Box 412, c/o *Flight*.

WANTED, for Olley Air Service, Ltd., Croydon, first class charter pilots with current B licence and, preferably, 2nd Class navigator's licence; good prospects and first class salaries offered to suitable applicants. [7194

EX-SERVICEMEN with engineering degrees may apply for special training as stress calculators on aircraft construction.—Apply in writing or in person, Labour Manager, Vickers-Armstrongs, Ltd., Weybridge Works, Weybridge, Surrey. [7135

AIRCRAFT repair work.—Ex-R.A.F. (Class A release), fitters, airframe and engine and electricians with experience on Wellington aircraft.—Apply Brooklands Aviation, Ltd., Brooklands Aerodrome, Weybridge, Surrey, or Buttocks Booth, Northampton. [0261

SENIOR design draughtsman, also an experimental engineer, are required by company in West Country; experience of light hydraulic servo controls essential; knowledge of carburettor automatic control work desirable; state age, experience and salary required.—Box 119, c/o *Flight*. [7159

EXPERIENCED aircraft stressmen required; good salaries and prospects, with long term programme of interesting work.—Applications, giving age, technical qualifications and experience, and stating salary required, should be addressed to the Chief Designer, Handley Page, Ltd., London, N.W.2. [7148

AIRCRAFT woodworkers or riggers required by Airwork General Trading Co., Ltd., at Gatwick Airport; only woodworkers or riggers with aircraft experience need apply.—Please write, stating experience, age, etc., to Staff Superintendent, Airwork General Trading Co., Ltd., Gatwick Airport, Horley, Surrey. [7124

THE FAIREY AVIATION Co., Ltd., Stockport, require senior draughtsmen for design work, draughtsmen for detail work, and senior and junior technical assistants.—Applications, stating full particulars to be made to the Labour Office, Fairey Aviation Co., Ltd., Crossley Rd., Heaton Chapel, Stockport, Cheshire. [7188

SITUATIONS VACANT—CONTD.

DRAUGHTSMAN required for aircraft design and for electrical installation work on post-war projects of outstanding interest and importance; experience in metal construction an advantage; please give full details of qualifications and salary required to: General Aircraft, Ltd., The London Air Park, Feltham, Middlesex. [7213

REQUIRED, two experienced aircraft schedule clerks, must be conversant with the preparation of schedules for R.A.F. aircraft, reading direct from the assembly drawings.—Applications in writing, stating previous experience, age and salary required, should be made to the Personnel Manager, Percival Aircraft, Ltd., Luton Airport, Beds. [0259

THE de Havilland Engine Co., Ltd., invite applications from designer draughtsmen, senior detail draughtsmen and checkers for aero engine work; applicants should have had experience in this class of work or in the automobile, diesel or marine engineering industry; applications will also be considered from draughtsmen having first class mechanical experience.—Applications should be addressed to the Personnel Manager, The de Havilland Engine Co., Ltd., Stonegrove, Edgware, Middx. [0266

SITUATIONS WANTED

"B" LICENCE pilot, 27, 1,000 hours twins and singles, accident-free record, experienced in passenger work, seeks flying position.—Box 439,

B LICENCE pilot, ex-R.A.F. F/O., seeks flying situation anywhere; 1,150 hours, singles, twins and multis; available immediately.—Box 470,

A1 category instructor, B licence, A.F.C., 4,200 hours accident-free, including 3,300 hours ab initio and instructor-training, ex-E.C.F.S. Examining Squadron, good lecturer, ex-F/Lt.—Box 413,

ENGINEER, A.F.R.Ae.S., vast practical experience, ex-R.A.F. apprentice, suitable for technical representative, service engineer or research worker, or any job with a view to engineer's licences.—Box 410, c/o *Flight*. [7192

EX-F.A.A. Squadron Commander seeks flying or administrative position with civil aviation; excellent record, above average assessment, 1,000 hours accident free in single types; references if required.—Box 469, c/o *Flight*. [7218

FLT./LT. pilot, 1,000 hours, 17 types, civil licence, desires temporary job while on demob. leave; fly anything, anywhere, any time, anyhow; for expenses only; or would consider interesting ground job; also consider permanency if attractive.—Box 440,

EX-NAVAL Air Arm officer (air engineer), aged 30, with 12 years' experience aeronautical engineering, pupil A.S.T., Hamble, held G.E.'s "A" and "C" licences, A.I.D. experience, seeks position with good prospects, very keen and energetic, will go anywhere.—Box 438, c/o *Flight*. [7206

EX-FLT/LT., R.A.F. Transport Command, navigator, 1,100 hrs., experience Atlantic ferry, Continental transport, and Far East monsoon flying, sound practical knowledge D.R., Astro, radar, and radio navigation, met., etc., desirous of progressive position civil aviation.—Box 414, c/o *Flight*. [7203

EX-R.A.F. Cpl. airframe fitter, age 23, single, 5 years' experience assembly, overhaul and maintenance, wood and metal aircraft, 2 years on transports, light aircraft and fitting out of private aircraft, seeks position in civil aviation affording opportunity for obtaining A.M.E. licences; available immediate interview.—Box 457, c/o *Flight*. [7212

TIME RECORDERS

TIME recorders—Service rental. Tel. Vigilant 4731.—Time Recorder Supply and Maintenance Co., 28, Mayfield Rd., Sutton, Surrey. [0196

STAFF time checking and job costing time recorders (all makes) for quick cash sale; exceptional condition.—Box 7020, c/o *Flight*. [0040

WANTED

WANTED, Irvin jacket or complete suit, chest 45in., height 6ft.—Cecil Kay, 10, Essex St., Birmingham. [7210

AIRCRAFT camera wanted, manual operated; offers to: Leadbetter, 386, College Rd., Birmingham. (Tel. 1344 Erdington.) [7205

IN MEMORIAM

IN proud and loving memory to-day, and every day, of Angus Vincent Piper, who died suddenly June 21, 1941. [7189

SAFT

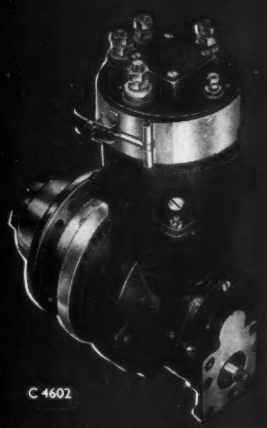
LONDON LINK TRAINER CENTRE

STRAIGHT AVIATION TRAINING LTD.

BUSH HOUSE, ALDWYCH, LONDON, W.C.2

Temple Bar 6828

feathering is safe, certain and simple



C 4602

ON THE DE HAVILLAND *"Dove"*

Contributing to the safety and reliability of the de Havilland Dove is a unique electrical component designed and manufactured by Rotax—a combined starter-motor and feathering-pump-motor. Its dependability as a starter ensures regularity to schedules—its certainty in feathering gives added confidence to crews and passengers. The achievement of both these functions for the light weight of only one component materially adds to the payload of this really beautiful modern aeroplane.

ROTAX

Electrical Equipment for Aircraft

ROTAX LIMITED • LONDON N.W.10 • ENGLAND

32 people with appointments...

It is interesting to consider the variety of reasons for travelling which could be revealed by an average passenger list of a civil transport aircraft. On a "Wayfarer" for instance . . . 32 people travelling, each with a purpose in view . . . a purpose which—in many cases depends on travelling time saved or lost for success or otherwise of a mission. With the inevitable expansion of civil airlines and automatic public recognition of scheduled regularity and reliability, airline operation will depend largely upon those power units with the greatest number of features in the "plus" margin. The "Bristol" range of sleeve-valve engines has many "plus" features . . . their rugged reliability has been war-proven . . . their high performance, especially at "critical altitudes," is exceptional . . . their economy in fuel and oil is—to a large extent—a tribute to the simplicity of the single sleeve-valve principle . . . a simplicity which makes maintenance a trouble-free routine matter.

Bristol

SLEEVE-VALVE

RADIAL ENGINES

CENTAURUS

18-cyl. sleeve-valve engine developing over 2,800 B.H.P.

HERCULES

14-cyl. sleeve-valve engine developing 1,800 B.H.P.

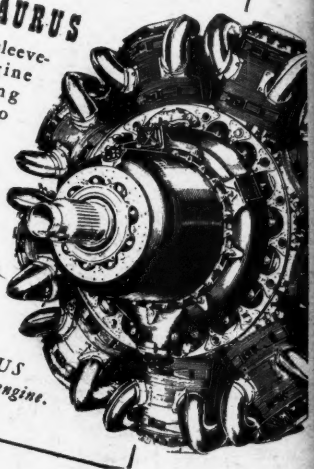


Illustration shows: the CENTAURUS *18-cyl. sleeve-valve engine.*

Bristol

. . pioneered and developed the single sleeve-valve principle

THE BRISTOL AEROPLANE COMPANY LIMITED

Printed in England for the Proprietors, FLIGHT PUBLISHING COMPANY LIMITED, Dorset House, Stamford Street, London, S.E.1, by THE CORNWALL PRESS LTD., 1-6, Paris Garden, London, S.E.1
"Flight" can be obtained abroad from the following: AUSTRALIA and NEW ZEALAND: Gordon & Gotch, Ltd. INDIA: A. H. Wheeler & Co. CANADA: Imperial News Co., Gordon & Gotch, Ltd
SOUTH AFRICA: Central News Agency, Ltd., Wm. Dawson & Sons (S.A.), Ltd. UNITED STATES: The International News Co. Entered as Second Class at the New York, U.S.A., Post Office.